STATUS OF FINAL PRODUCT

WILL SHOW SAMPLE RESULTS FROM DIFFERENT SIMULATIONS

PREVIOUS WHOLE DAY RUN AT JPL

LATEST WHOLE DAY

CHANGES AFFECTING WHEN TO DO REGRESSION STEP

CHANGES IN TRUTH

% ACCEPTANCE IS LOW

NEEDS MORE STUDY

1 SCAN LINE PER GRANULE (PREVIOUS TRUTH) RUN AT GODDARD

8 SCAN LINES – OLDER TRUTH – RUN AT GODDARD

CLOUD PARAMETERS

TRUE CLOUDS

2 LAYERS $\alpha_1 \varepsilon_{1\upsilon} P_{c_1}, \alpha_2 \varepsilon_{2\upsilon} P_{c_2}$

RETRIEVED CLOUDS

2 LAYERS $(\alpha\varepsilon)_1 P_{c_1}, (\alpha\varepsilon) P_{c_2}$

CURRENTLY ASSUME $\varepsilon = 0.9$ FOR EACH LAYER

RADIANCES ARE A FUNCTION OF $\alpha\varepsilon$

ERRORS IN ε CONTRIBUTE TO ERRORS IN α

STATISTICS

$$\alpha_{TOT} = (\alpha_1 + \alpha_2)$$

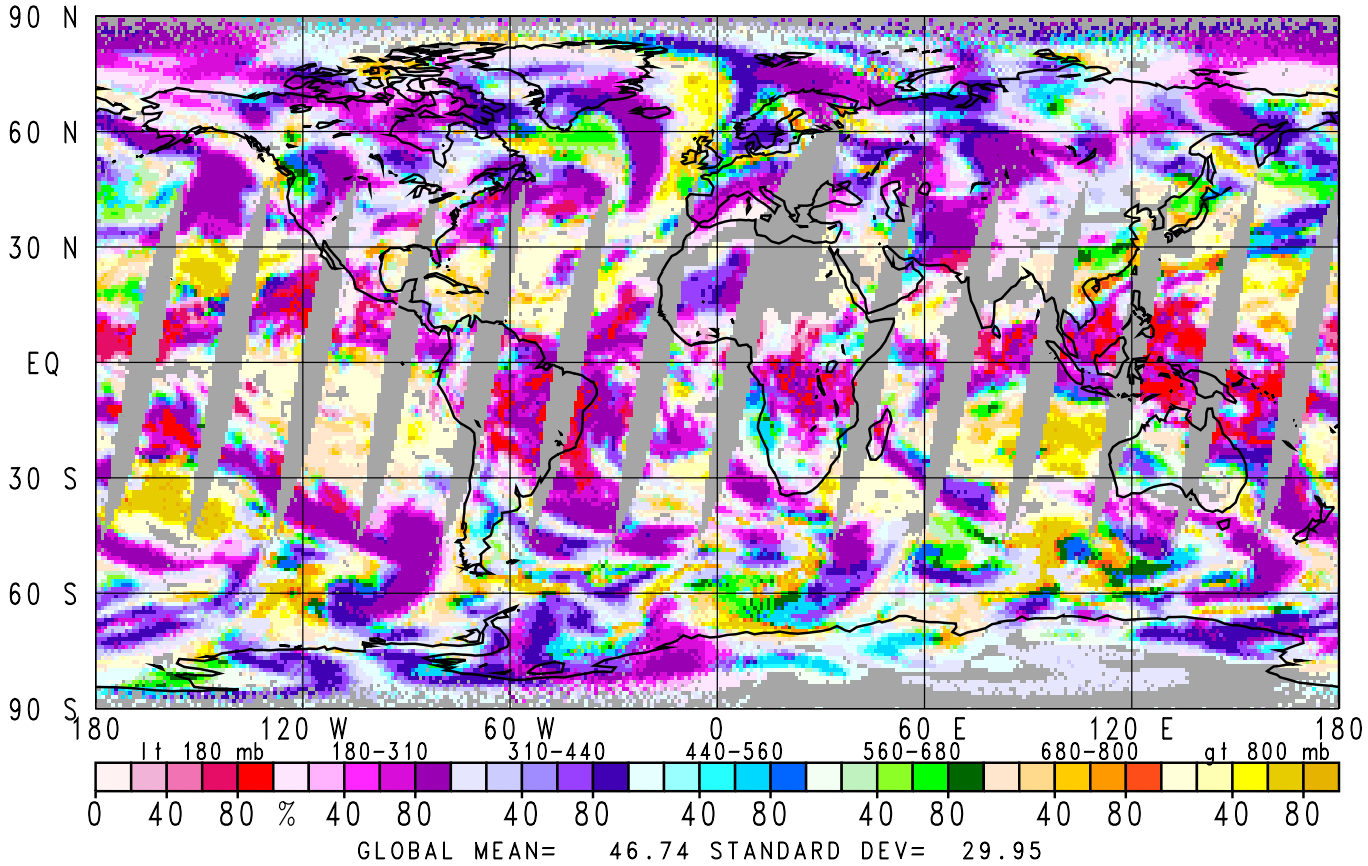
$$P_{c_{TOT}} = \frac{\alpha_1 P_{c_1} + \alpha_2 P_{c_2}}{\alpha_1 + \alpha_2}$$

SHOULD USE $\alpha\varepsilon_{\bar{\upsilon}}$ FOR STANDARD $\bar{\upsilon}$ INSTEAD OF α IN STATISTIC

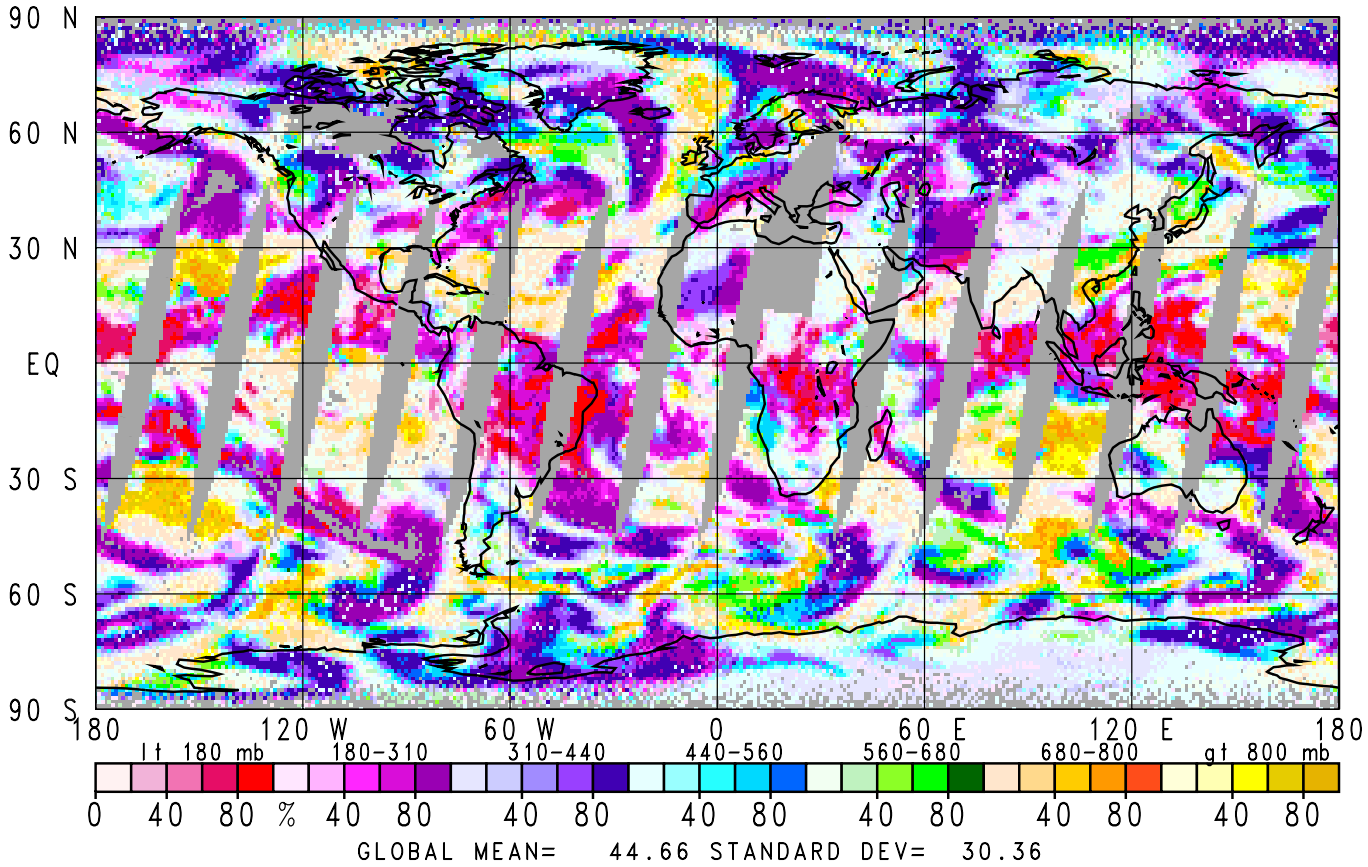
AIRS Cloud Parameters

December 15, 2000 Nighttime Original Run

Truth



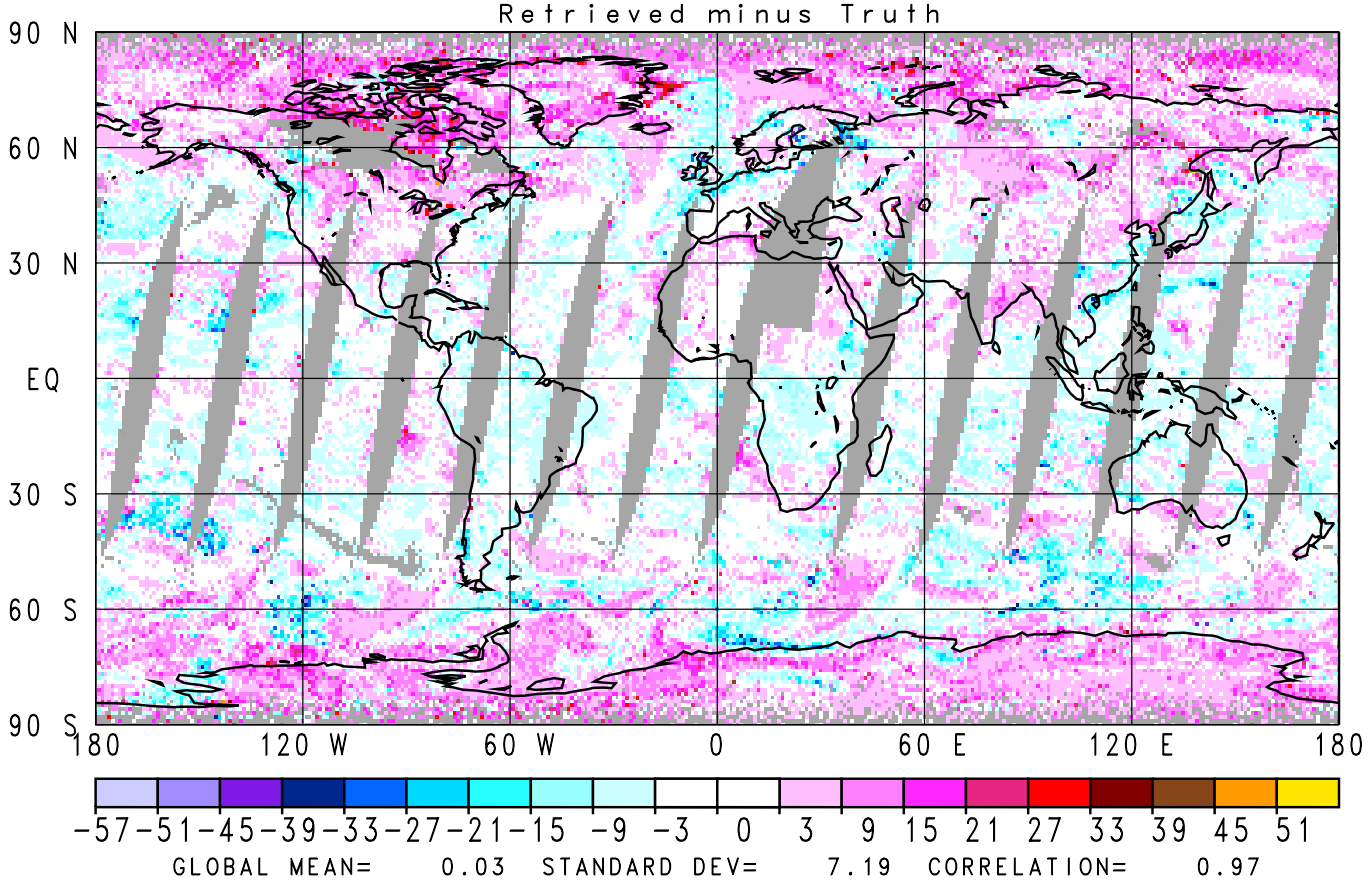
Retrieved



AIRS Cloud Parameters

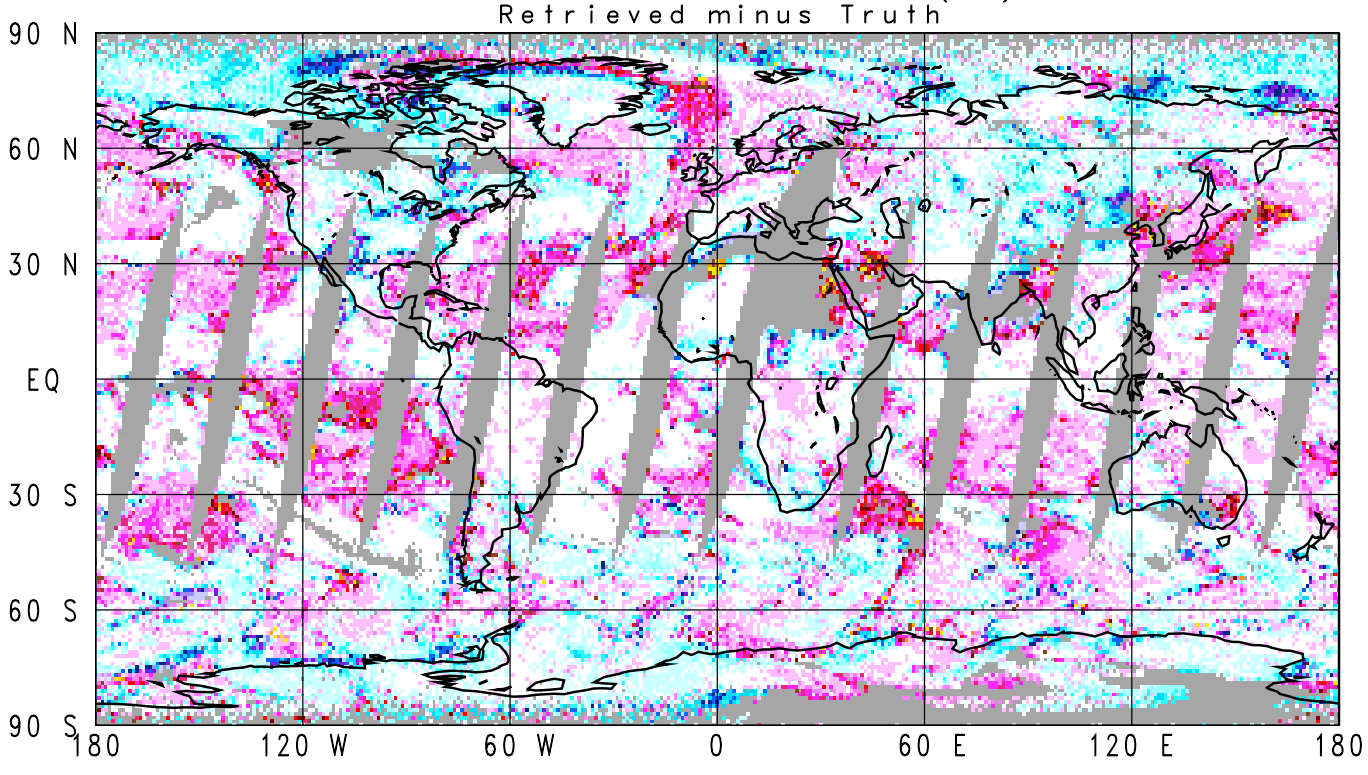
December 15, 2000 Nighttime Original Run

AIRS CLOUD FRACTION %
Retrieved minus Truth



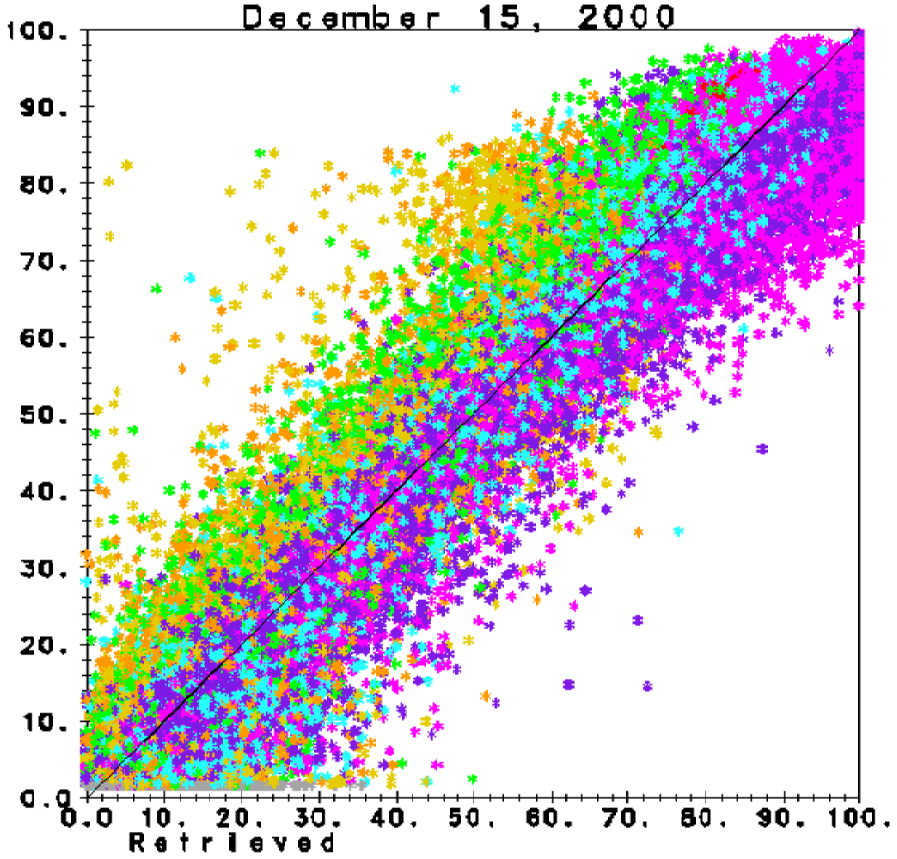
GLOBAL MEAN= 0.03 STANDARD DEV= 7.19 CORRELATION= 0.97

AIRS CLOUD TOP PRESSURE (mb)
Retrieved minus Truth



GLOBAL MEAN= -7.69 STANDARD DEV= 105.11 CORRELATION= 0.87

AIRS Cloud Fraction and Cloud Top Pressure
December 15, 2000



Retrieved

Global mean = 45.73

Variance = 31.27

Truth

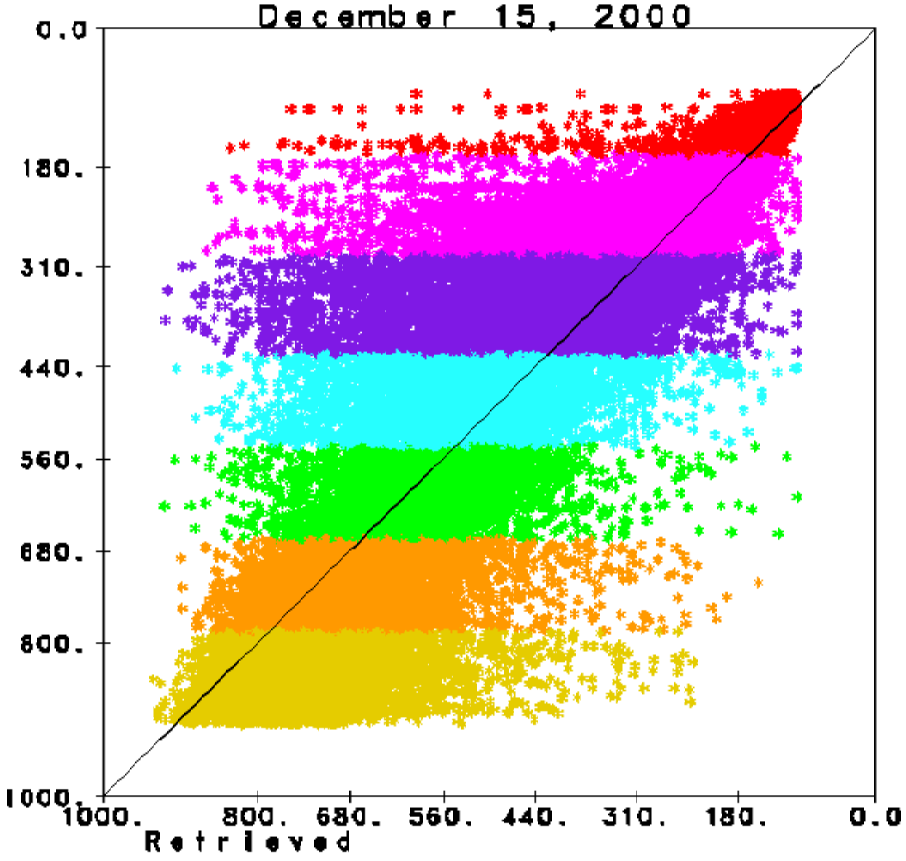
Global mean = 44.24

Variance = 30.94

Correlation = 0.97

RMS diff = 8.11

AIRS Cloud Top Pressure
December 15, 2000



Retrieved

Global mean = 448.93

Variance = 189.17

Truth

Global mean = 445.75

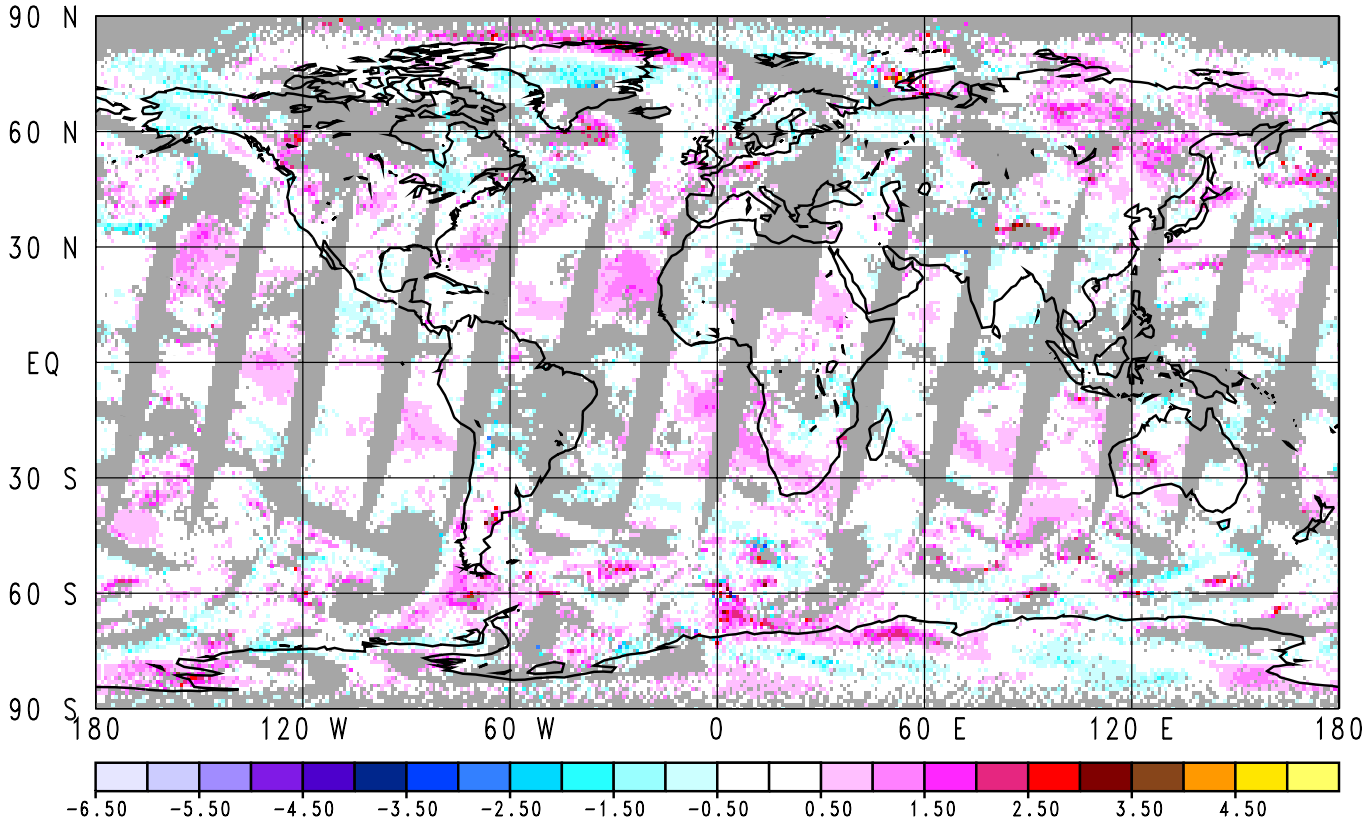
Variance = 215.91

Correlation = 0.87

RMS diff = 107.21

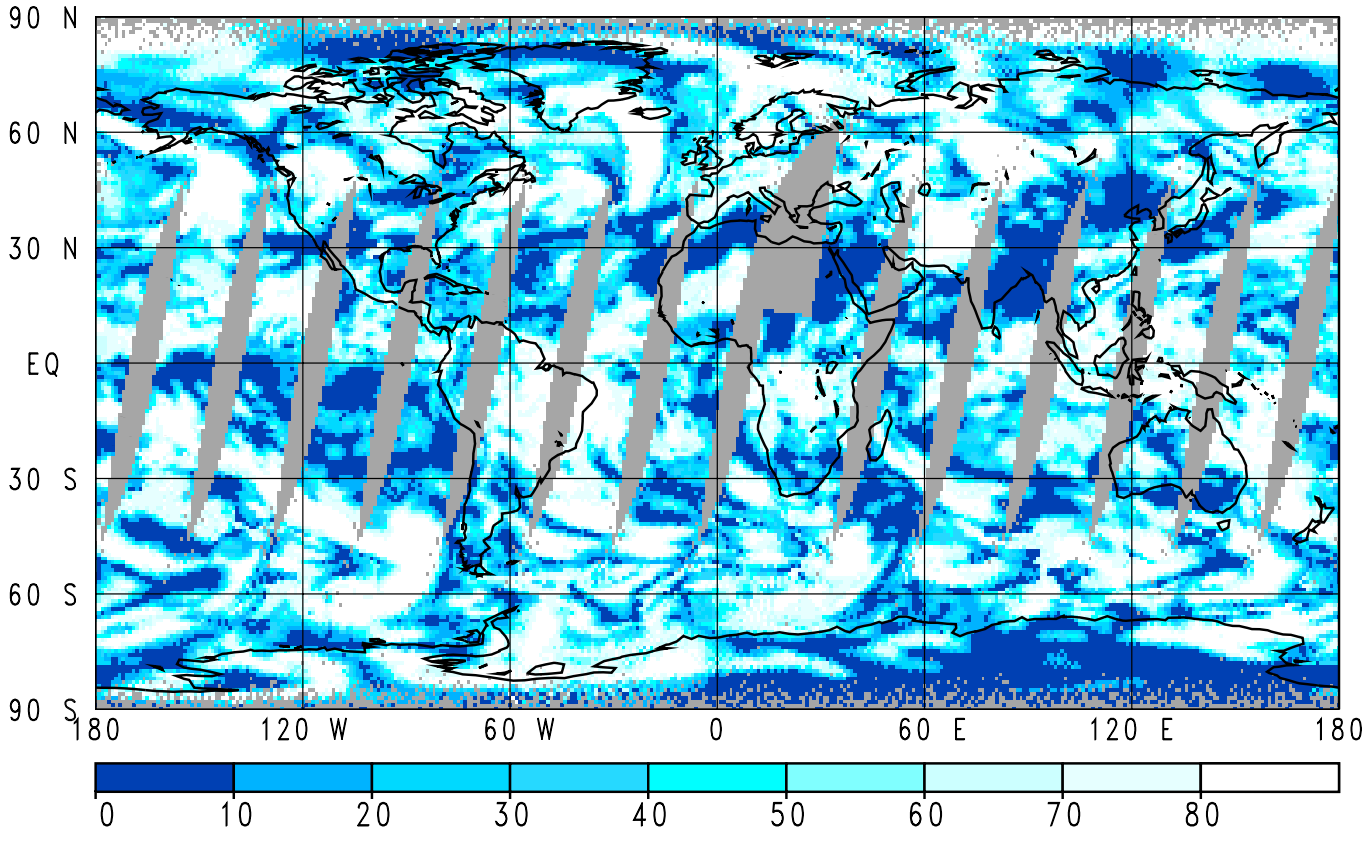
December 15, 2000 Nighttime Original Run

AIRS 500 to 600 mb Layer Mean Temperature (C)
Retrieved minus Truth



GLOBAL MEAN= 0.13 STANDARD DEV= 0.59

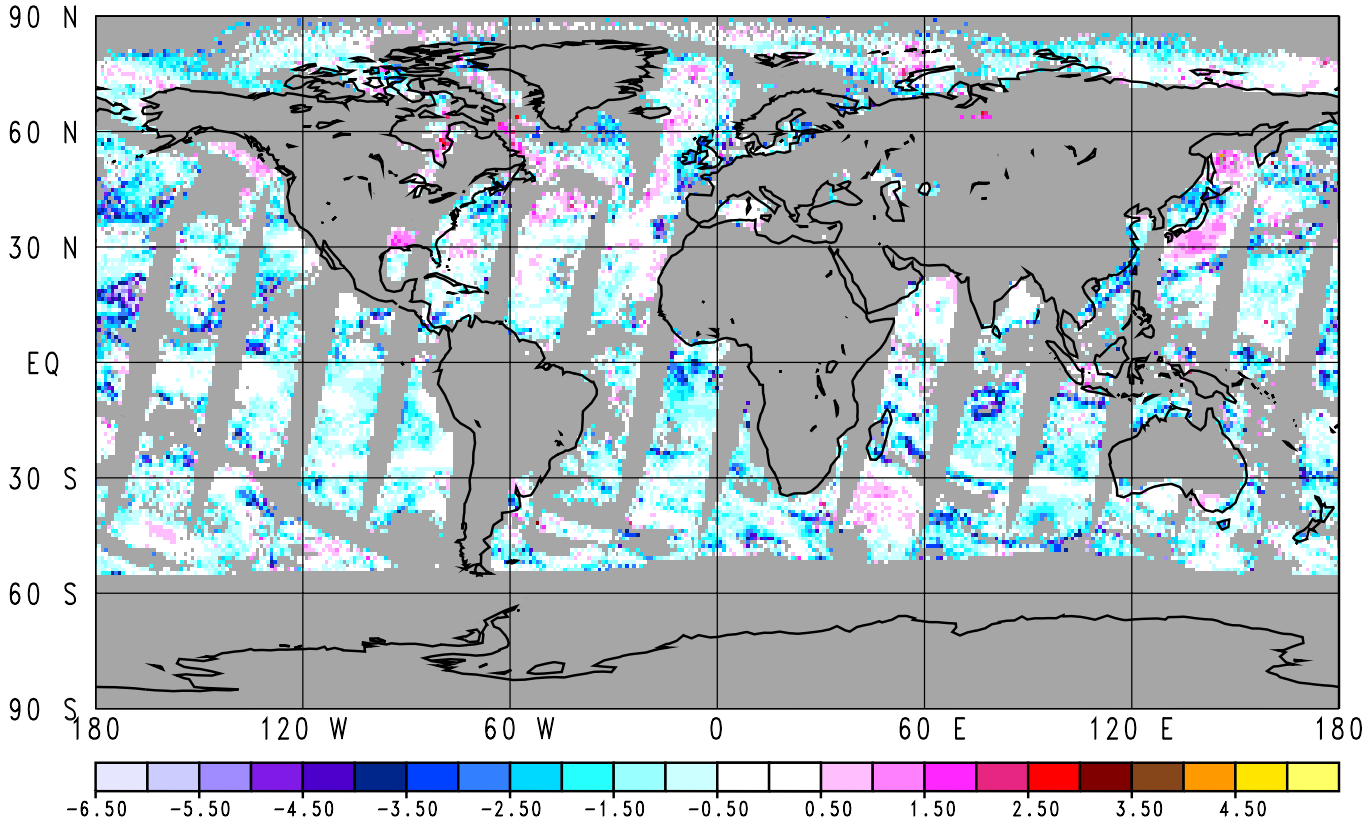
AIRS EFFECTIVE CLOUD FRACTION (%)
Truth



GLOBAL MEAN= 45.17 STANDARD DEV= 30.62

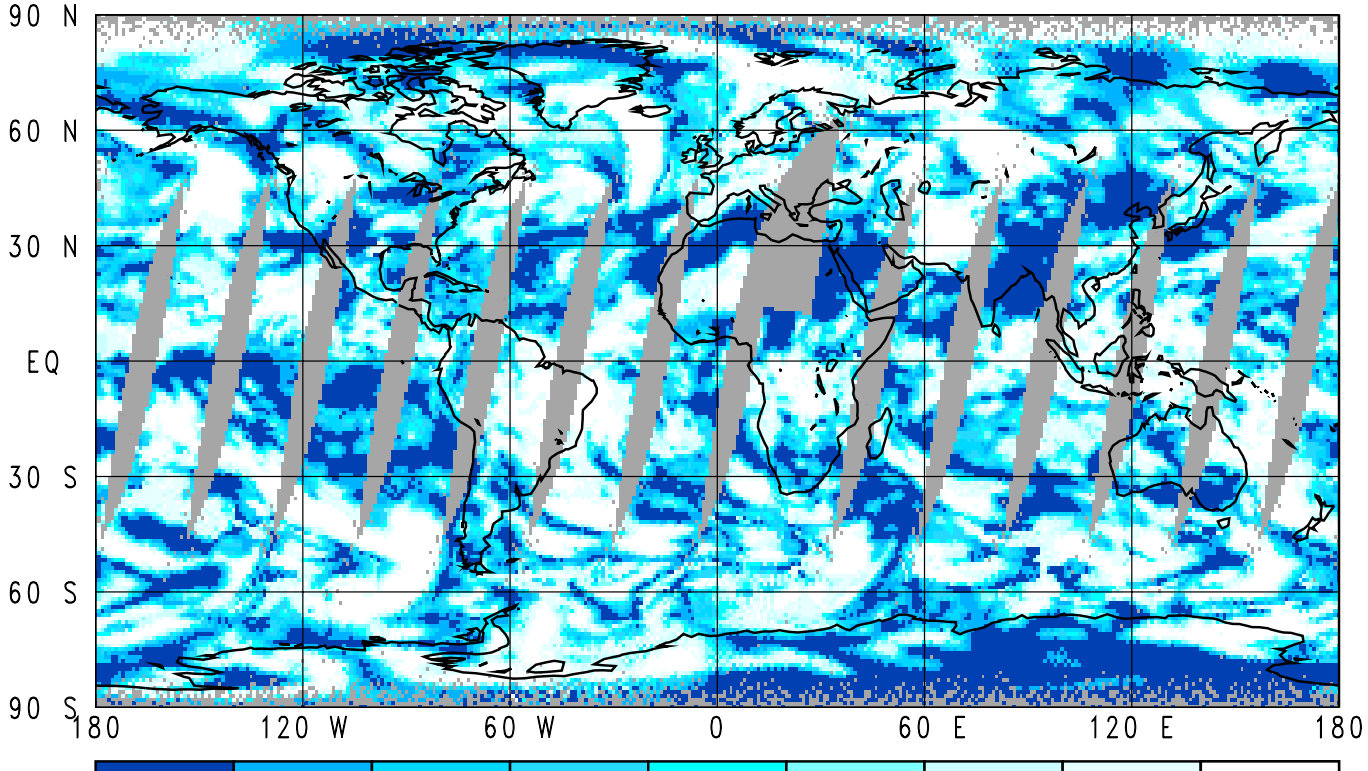
December 15, 2000 Nighttime Original Run

AIRS 850 to 1000 mb Layer Mean Temperature (C)
Retrieved minus Truth



GLOBAL MEAN= -0.83 STANDARD DEV= 1.11

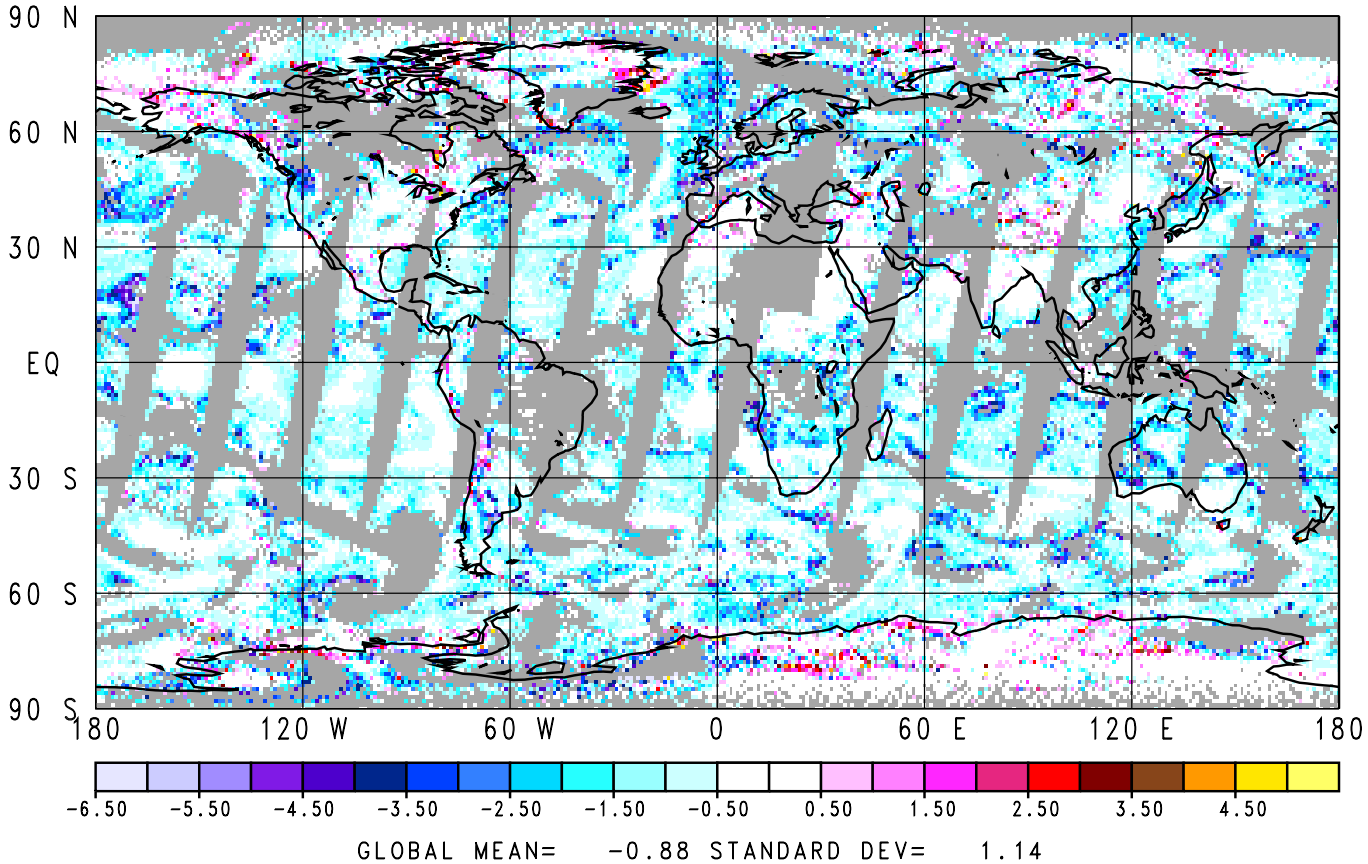
AIRS EFFECTIVE CLOUD FRACTION (%)
Truth



GLOBAL MEAN= 45.17 STANDARD DEV= 30.62

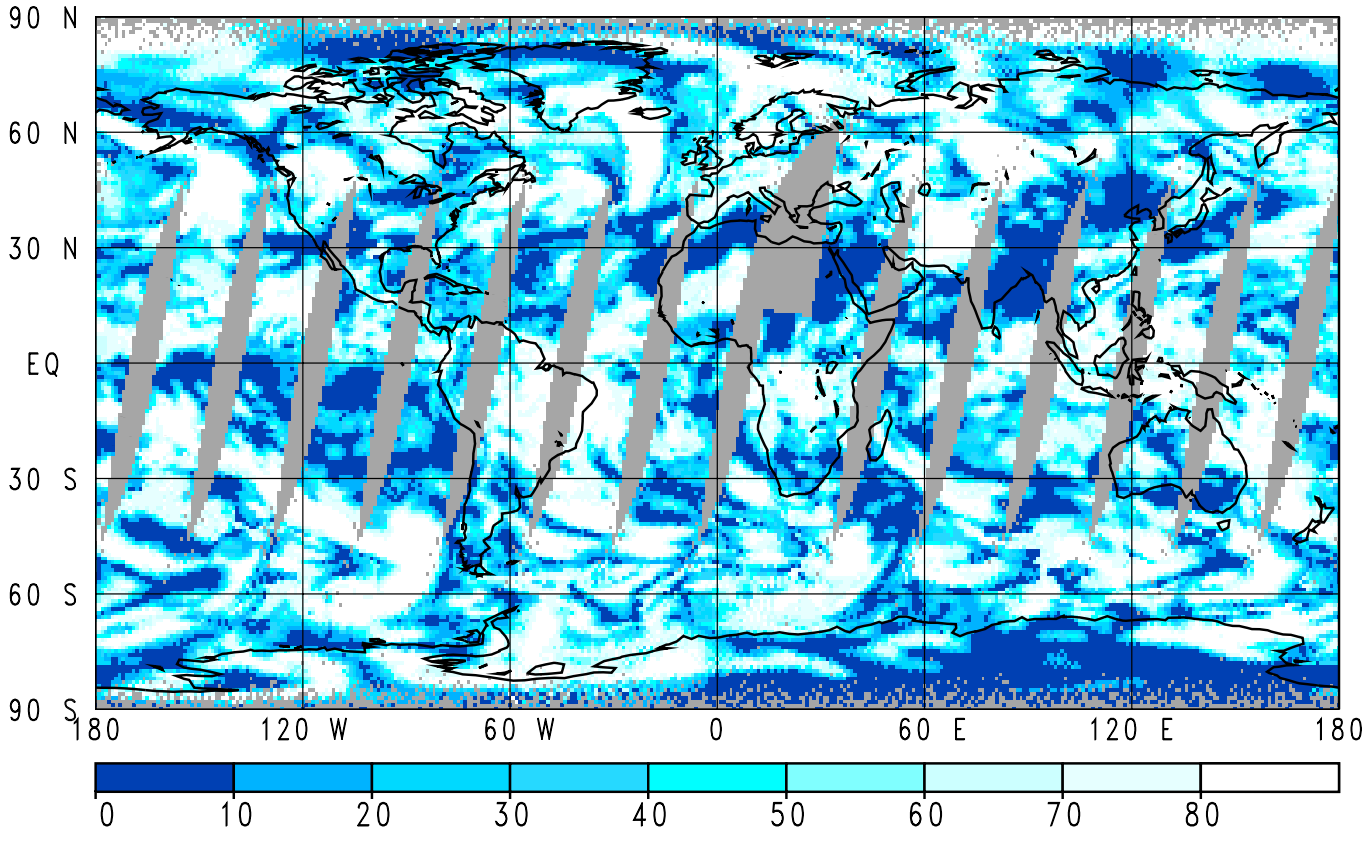
December 15, 2000 Nighttime Original Run

AIRS Surface Skin Temperature (C)
Retrieved minus Truth

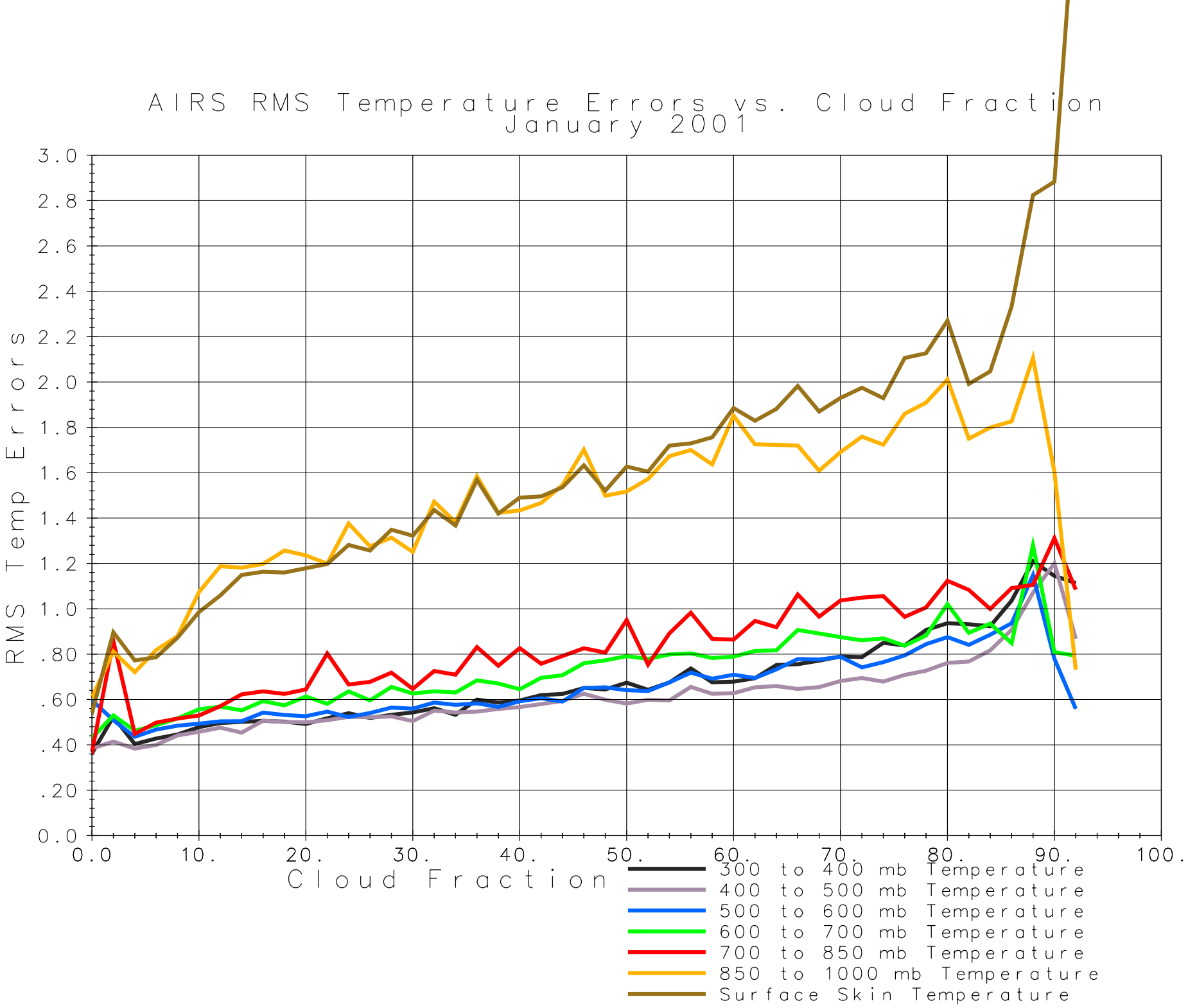


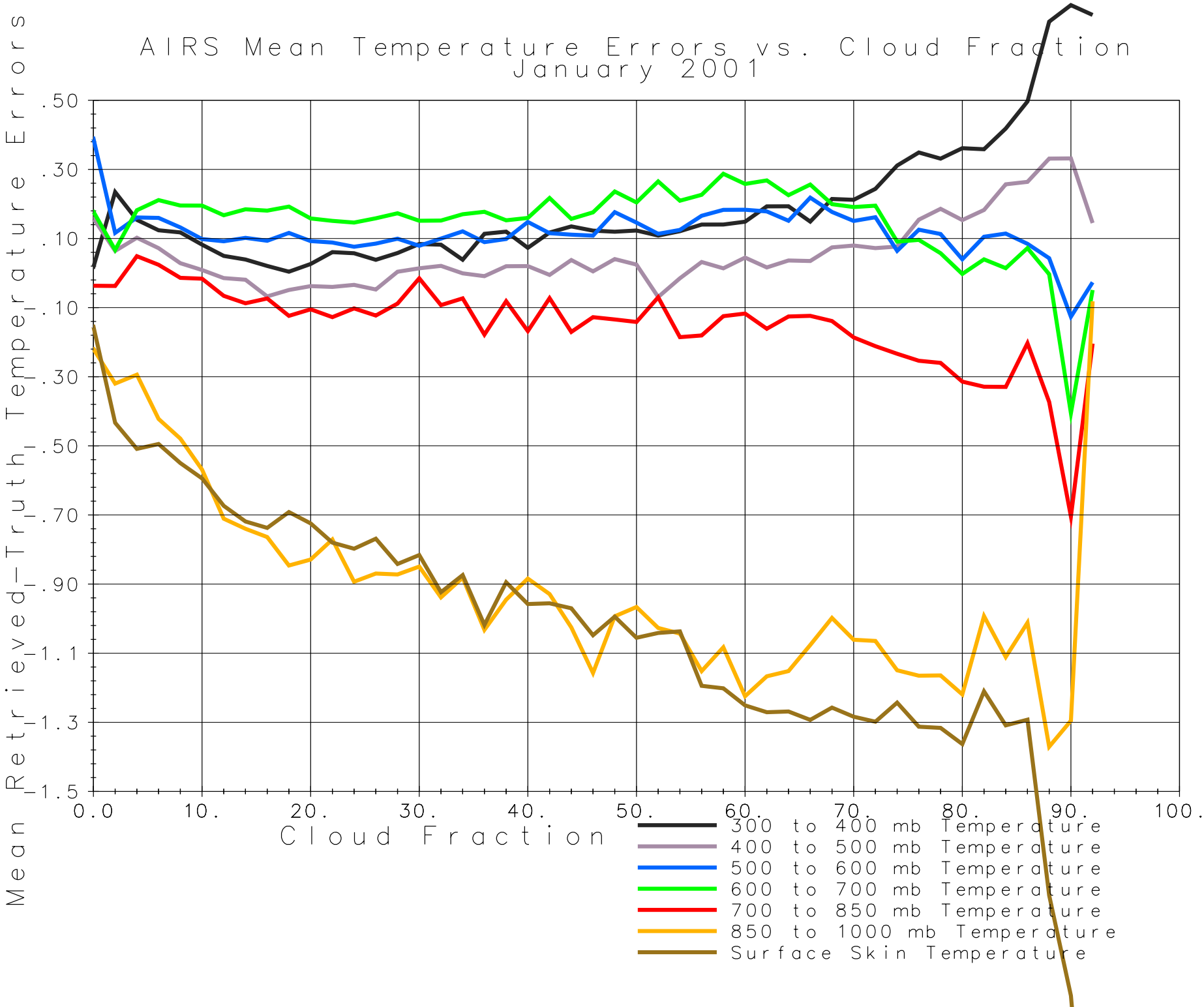
GLOBAL MEAN= -0.88 STANDARD DEV= 1.14

AIRS EFFECTIVE CLOUD FRACTION (%)
Truth



GLOBAL MEAN= 45.17 STANDARD DEV= 30.62

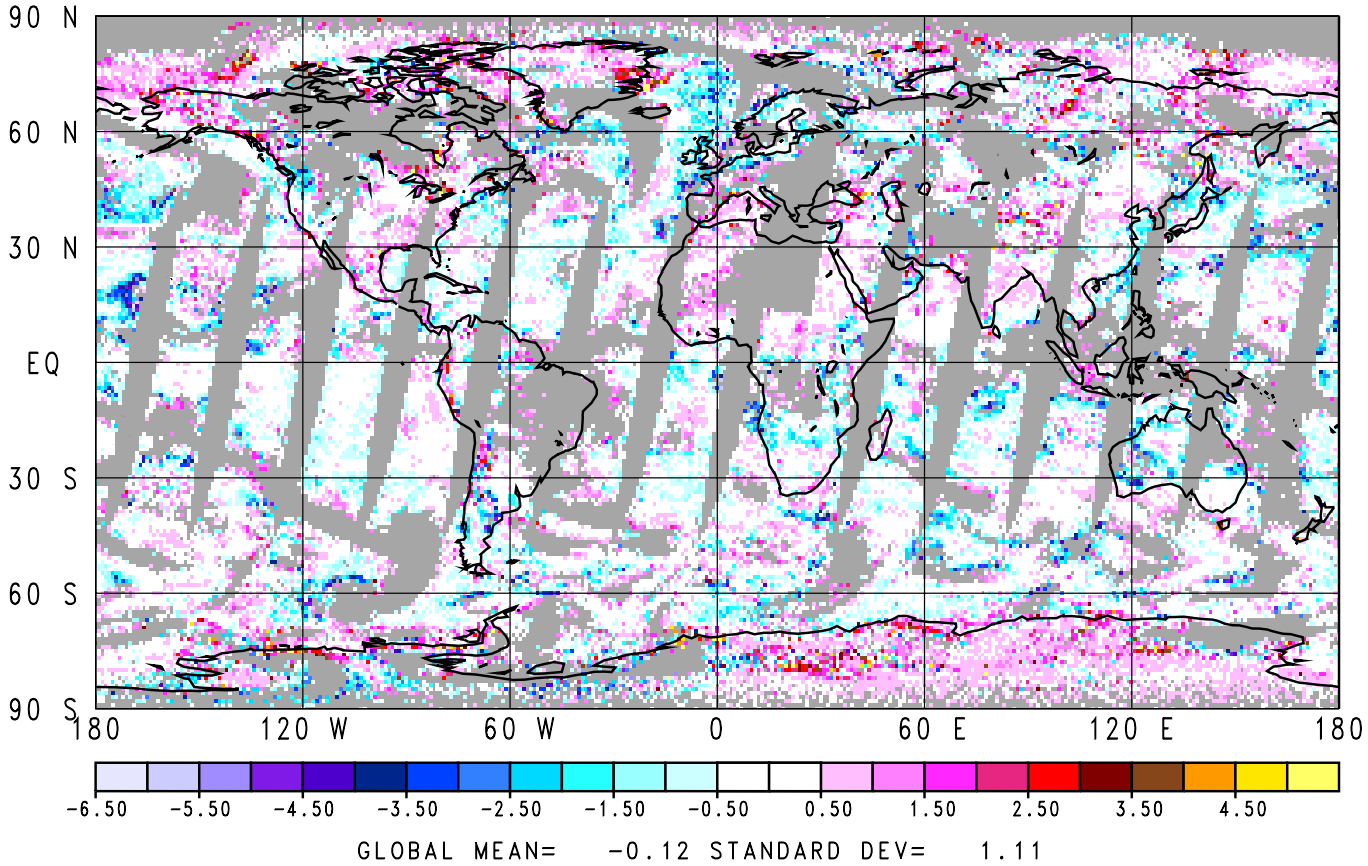

AIRS RMS Temperature Errors vs. Cloud Fraction
January 2001
RMS Temp Errors
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.80
.60
.40
.20
0.0
0.0
10.
20.
30.
40.
50.
60.
70.
80.
90.
100.
Cloud Fraction
300 to 400 mb Temperature
400 to 500 mb Temperature
500 to 600 mb Temperature
600 to 700 mb Temperature
700 to 850 mb Temperature
850 to 1000 mb Temperature
Surface Skin Temperature


AIRS Mean Temperature Errors vs. Cloud Fraction
January 2001
Mean Retrieved−Truth Temperature Errors
.50
.30
.10
−.10
−.30
−.50
−.70
−.90
−1.1
−1.3
−1.5
0.0
10.
20.
30.
40.
50.
60.
70.
80.
90.
100.
Cloud Fraction
300 to 400 mb Temperature
400 to 500 mb Temperature
500 to 600 mb Temperature
600 to 700 mb Temperature
700 to 850 mb Temperature
850 to 1000 mb Temperature
Surface Skin Temperature

AIRS Surface Skin Temperature Error(K)

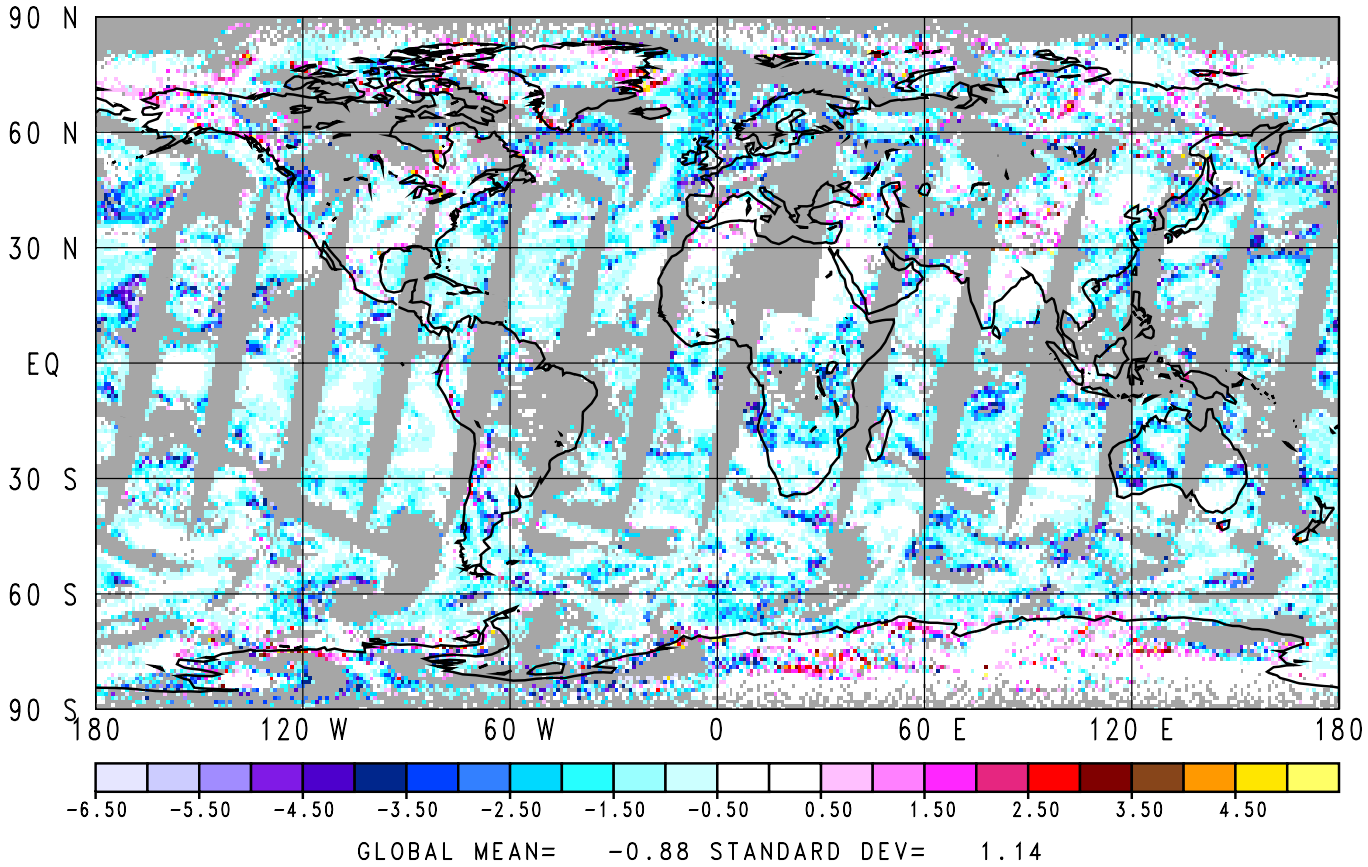
December 15, 2000 Nighttime Original Run

Adjusted Temperature Error



GLOBAL MEAN= -0.12 STANDARD DEV= 1.11

Unadjusted Temperature Error



GLOBAL MEAN= -0.88 STANDARD DEV= 1.14

DIFFERENCES BETWEEN ORIGINAL AND RERUN CASES

TRUTH

- CHANGES IN SURFACE PRESSURE
- CHANGES IN CLOUD LIQUID WATER
  - LIQUID WATER HAS INCREASED CONSIDERABLY
- CHANGES IN LOW CLOUD AMOUNT
  - LOW CLOUDS INCREASED SOMEWHAT

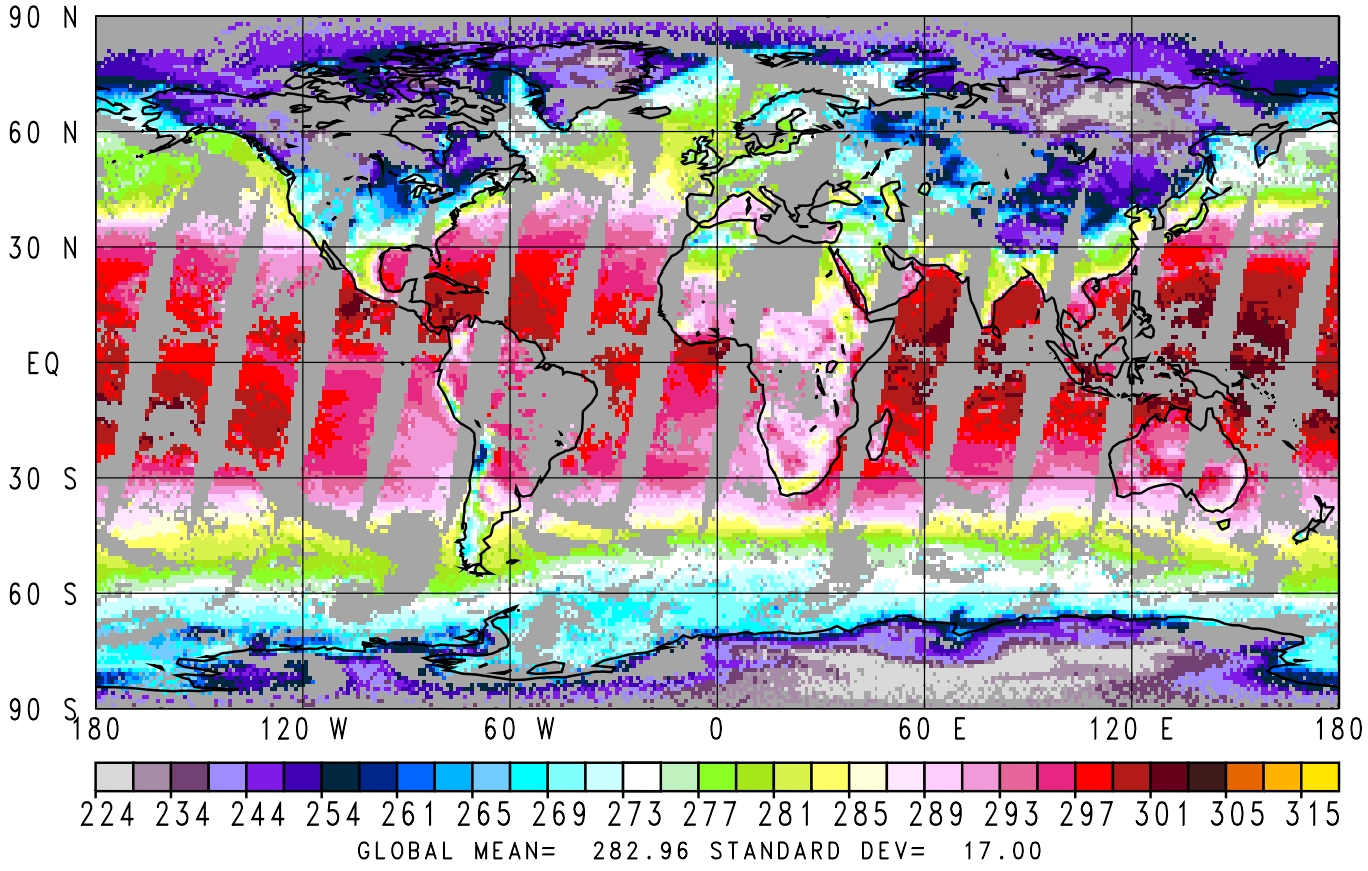
RETRIEVALS

- CHANGED FACTORS AFFECTING INITIAL CLEAR COLUMN RADIANCES
  - USE WINDOW CHANNELS IN INITIAL CLOUD CLEARING
  - ALLOW UP TO 4 CLOUD FORMATIONS IN SOLUTION
    - SEEMS TO IMPROVE INITIAL CLEAR COLUMN RADIANCES
    - GREATLY LOWERS NUMBER OF TIMES REGRESSION IS PERFORMED
    - WE HAVE TO CHECK TRESHOLDS ON WHEN TO DO REGRESSION
      - FIT TO CLEAR RADIANCE ESTIMATES
      - FIT OF PRINCIPAL COMPONENTS TO CHANNEL RADIANCES

AIRS Surface Skin Temperature (K)

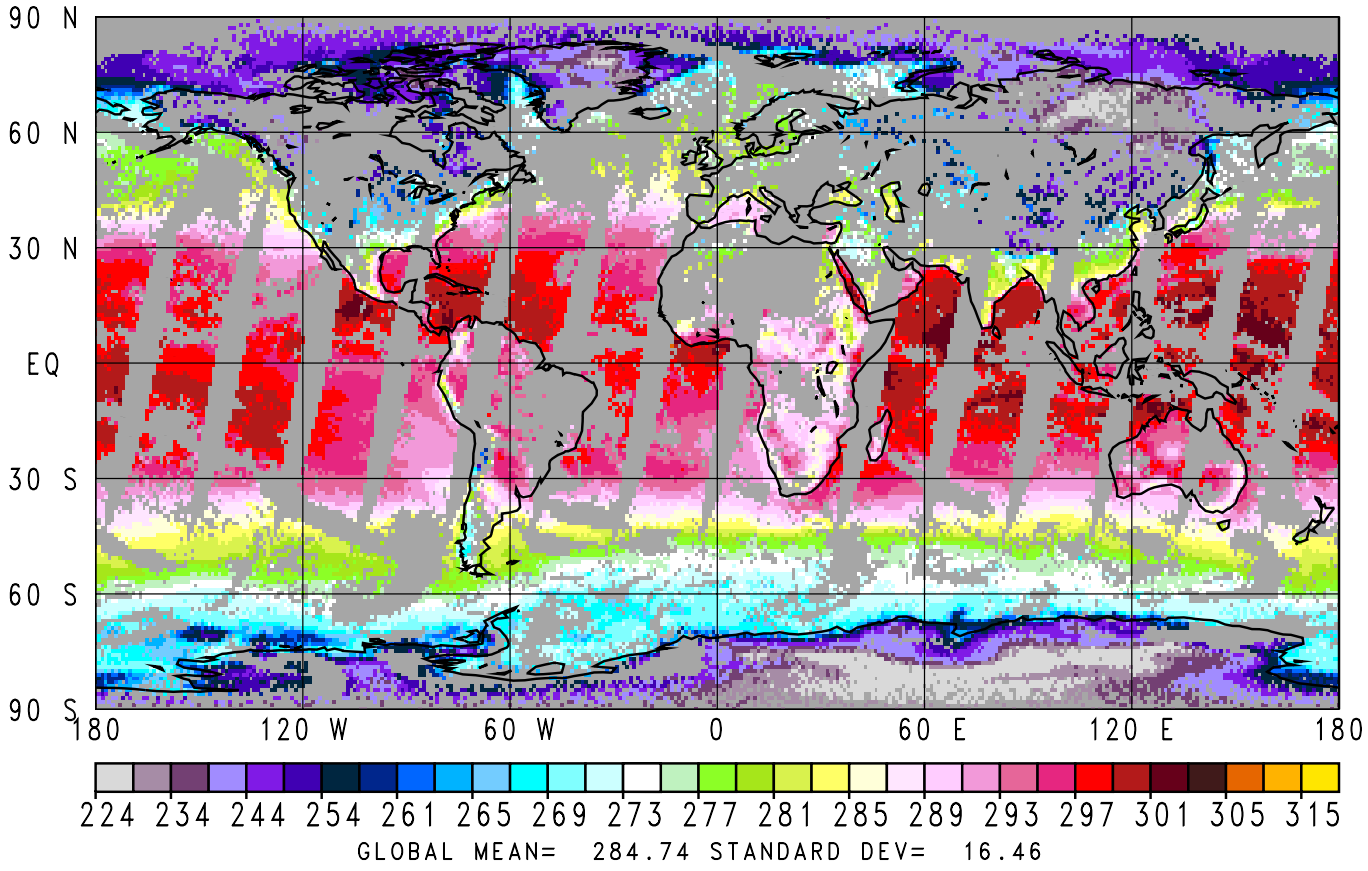
December 15, 2000 Nighttime

Original Run



GLOBAL MEAN= 282.96 STANDARD DEV= 17.00

Re-run



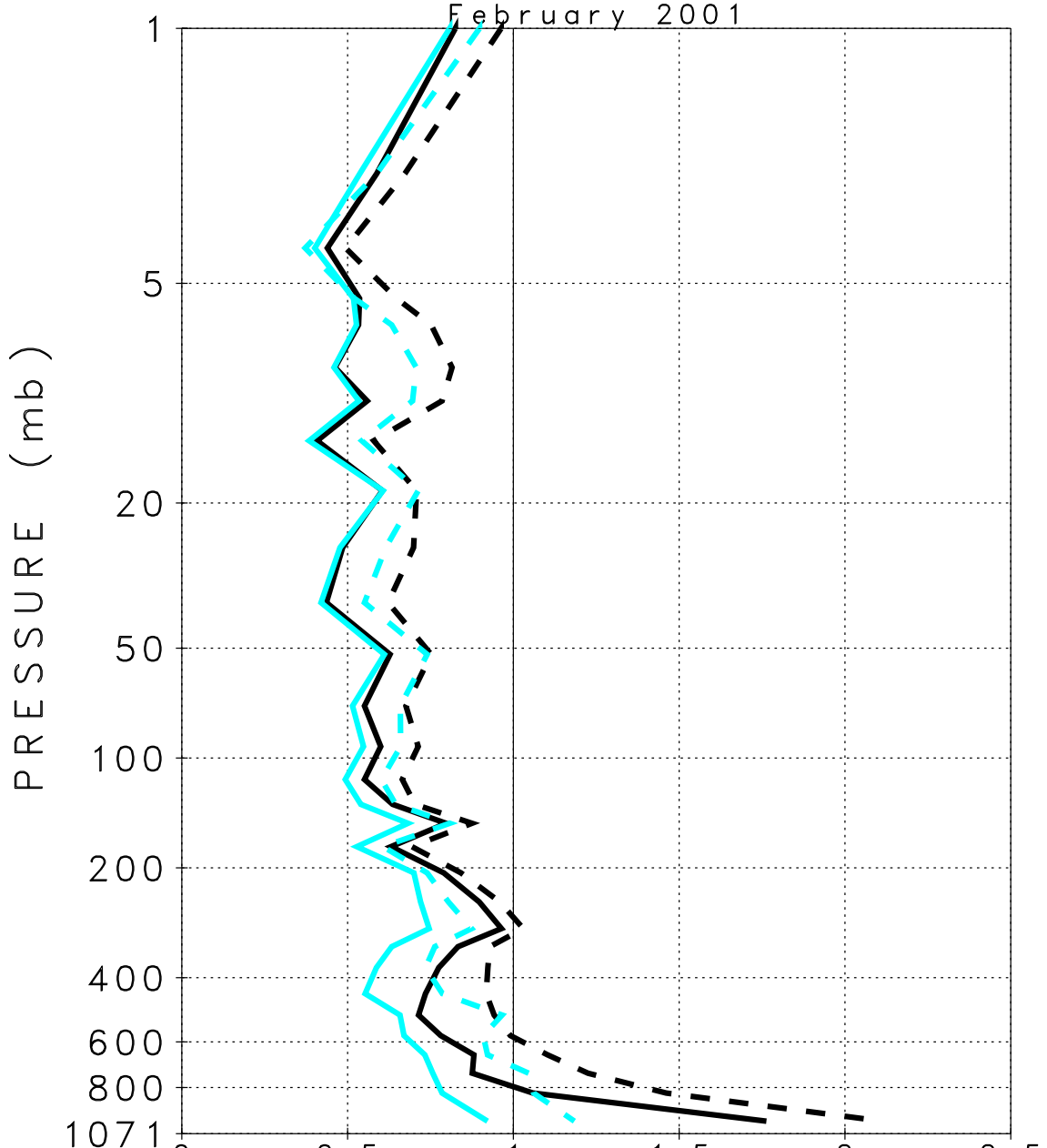
GLOBAL MEAN= 284.74 STANDARD DEV= 16.46

Original Run of December 15, 2000

CASE 3 and 7

LAYER MEAN RMS TEMPERATURE ERRORS (°C)

February 2001



TEMPERATURE RMS ERRORS

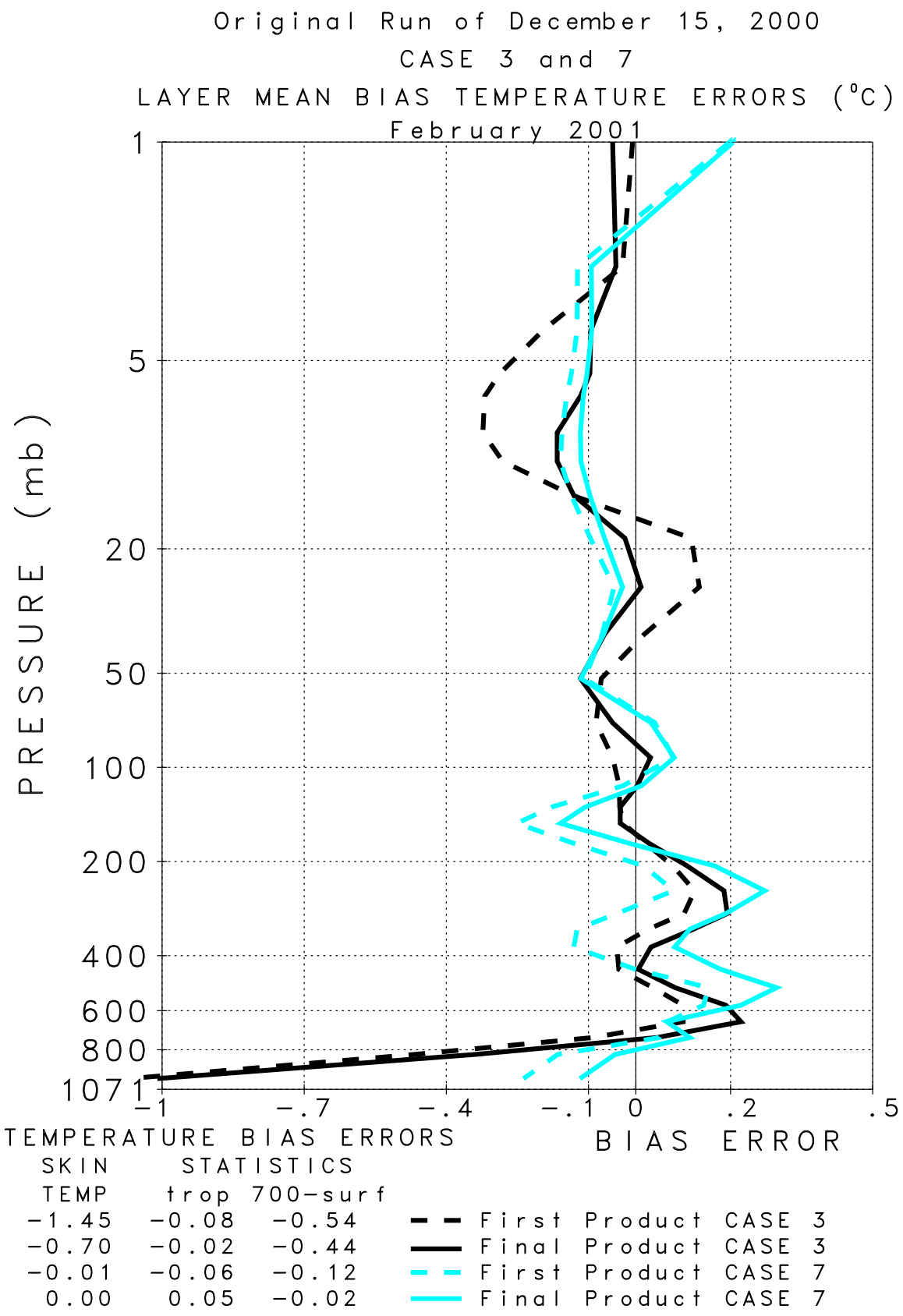
SKIN TEMP	STATISTICS trop	700-surf
2.56	1.00	1.60
1.30	0.84	1.23
0.61	0.81	1.10
0.35	0.66	0.82

First Product CASE 3

Final Product CASE 3

First Product CASE 7

Final Product CASE 7

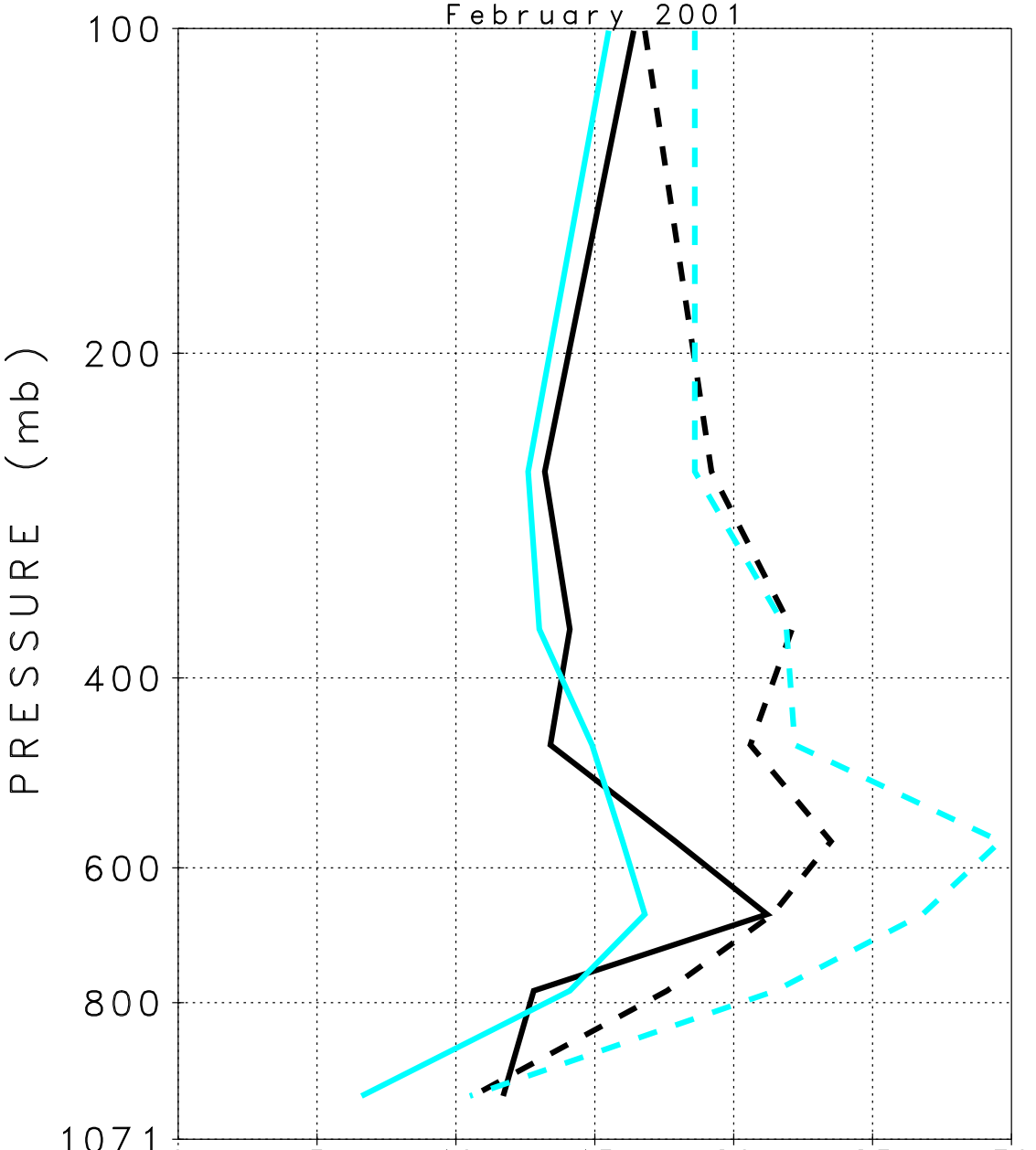

Original Run of December 15, 2000
CASE 3 and 7
LAYER MEAN BIAS TEMPERATURE ERRORS (°C)
February 2001
PRESSURE (mb)
1
5
20
50
100
200
400
600
800
1071
−1
−.7
−.4
−.1
0
.2
.5
BIAS ERROR
TEMPERATURE BIAS ERRORS
SKIN TEMP
STATISTICS
trop
700−surf
−1.45 −0.08 −0.54
−0.70 −0.02 −0.44
−0.01 −0.06 −0.12
0.00 0.05 −0.02
First Product CASE 3
Final Product CASE 3
First Product CASE 7
Final Product CASE 7

Original Run of December 15, 2000

CASE 3 and 7

2 Km LAYER PRECIPITABLE WATER PERCENT ERRORS

February 2001



WATER RMS ERRORS

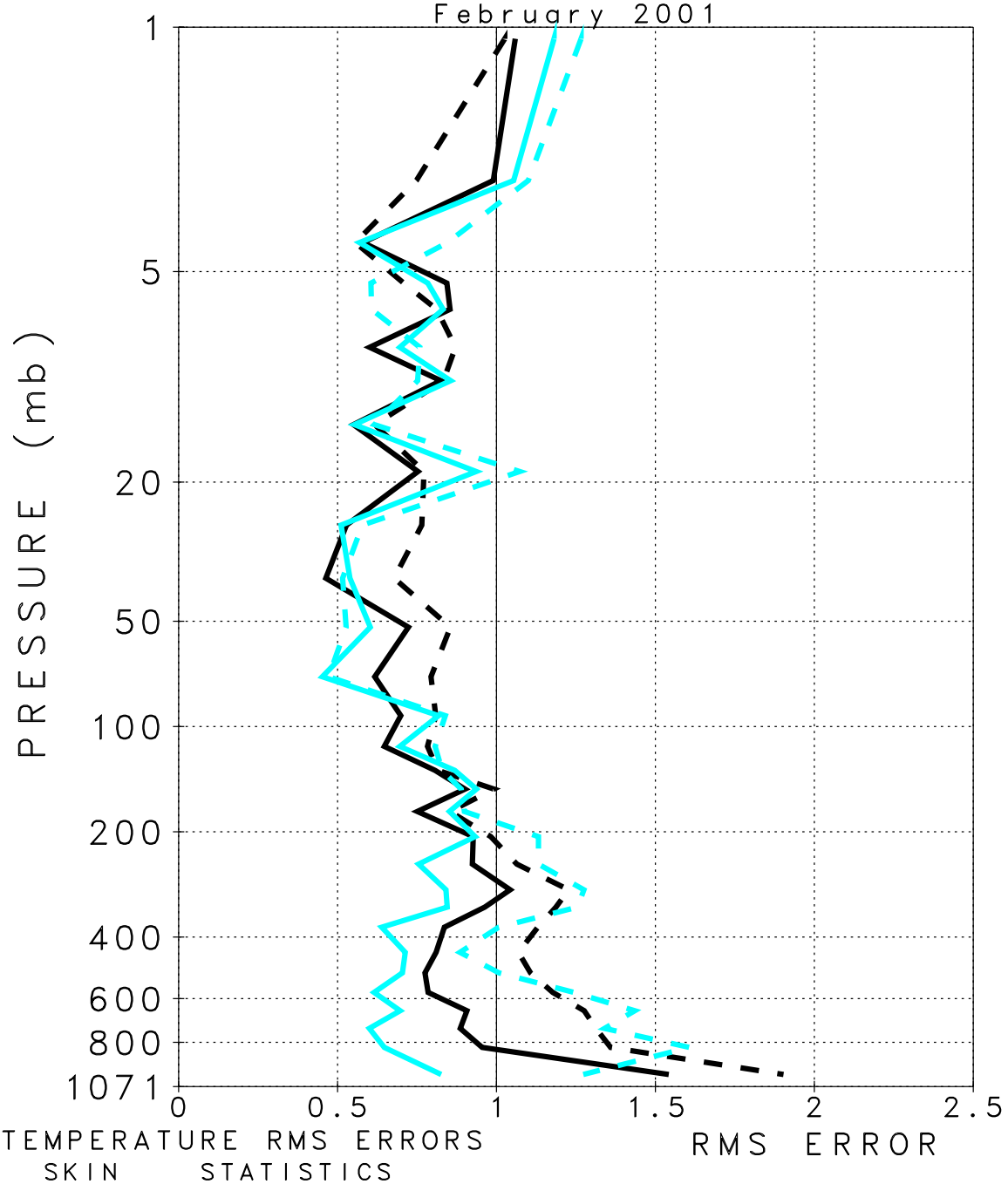
Total %	2 Km LAYER %	
15.0	19.0	First Product Case 3
13.5	15.1	Final Product Case 3
16.7	21.2	First Product Case 7
10.0	13.7	Final Product Case 7

GSFC System

1st Scan Line (Case 3) and 8 Track

LAYER MEAN RMS TEMPERATURE ERRORS (°C)

February 2001



TEMPERATURE RMS ERRORS

SKIN TEMP	STATISTICS 100-surf	200-surf
1.66	1.14	1.26
1.03	0.90	0.95
2.08	1.13	1.22
0.73	0.76	0.72

First Product 1st Scan Line

Final Product 1st Scan Line

First Product 8 Track

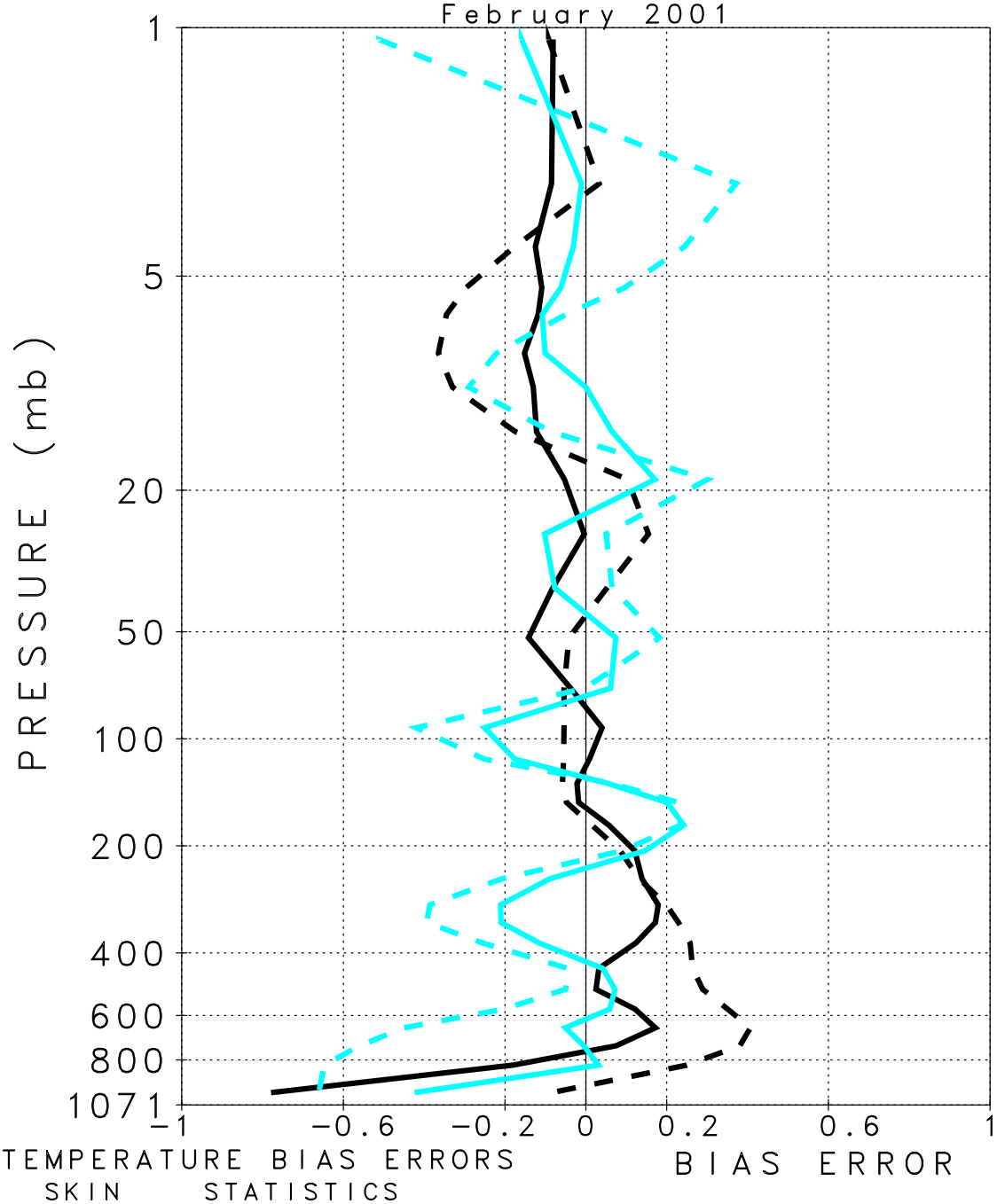
Final Product 8 Track

GSFC System

1st Scan Line (Case 3) and 8 Track

LAYER MEAN BIAS TEMPERATURE ERRORS (°C)

February 2001



TEMPERATURE BIAS ERRORS

SKIN TEMP	STATISTICS 100−surf	200−surf
−0.13	0.16	0.24
−0.61	0.01	0.01
−1.39	−0.22	−0.35
−0.37	−0.03	−0.08

First Product 1st Scan Line

Final Product 1st Scan Line

First Product 8 Track

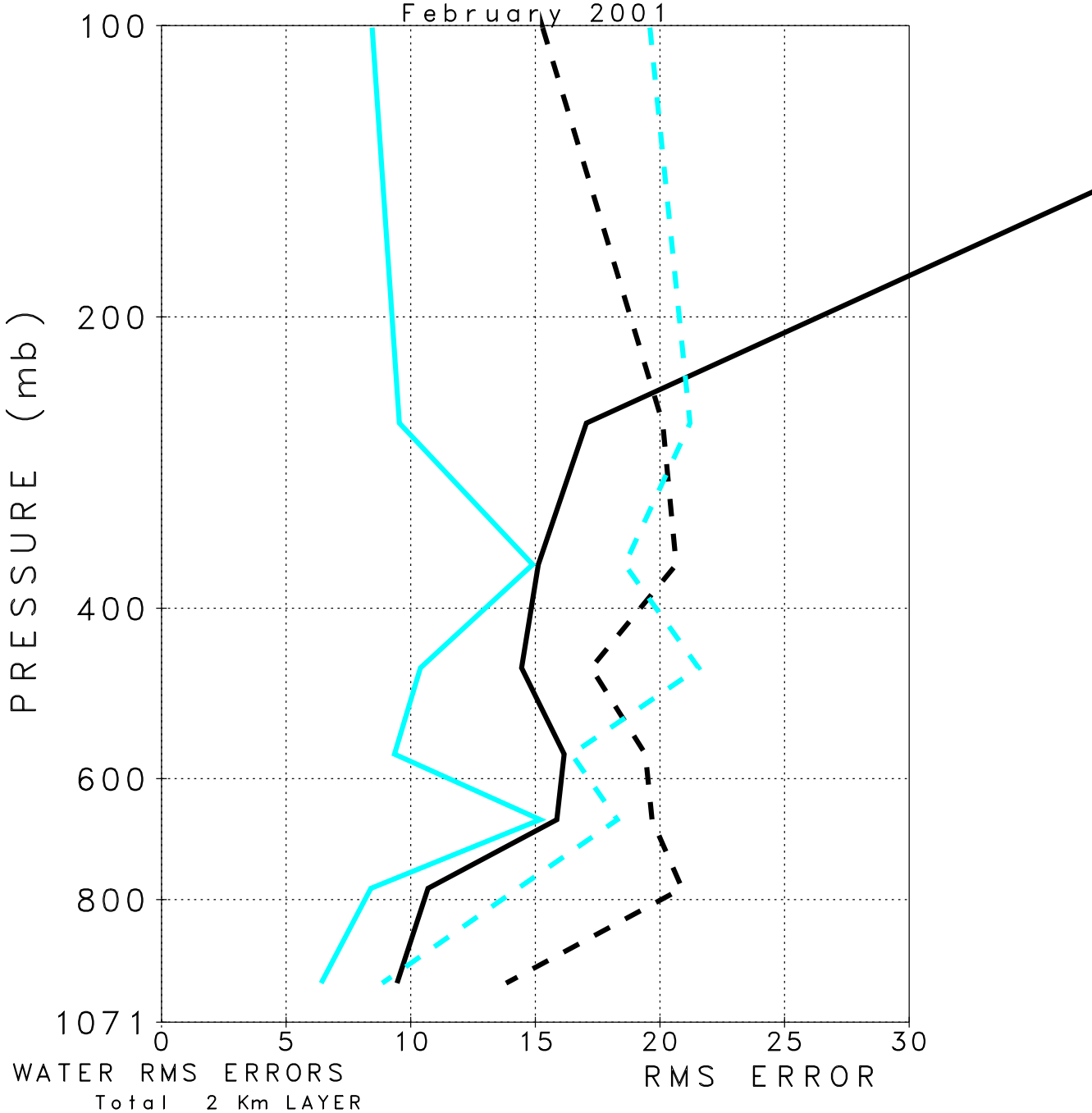
Final Product 8 Track

GSFC System

1st Scan Line (Case 3) and 8 Track

2 Km LAYER PRECIPITABLE WATER PERCENT ERRORS

February 2001



WATER RMS ERRORS

Total %	2 Km LAYER %
13.1	18.8
3.7	14.1
8.5	17.0
2.8	10.6

First Product 1st Scan Line

Final Product 1st Scan Line

First Product 8 Track

Final Product 8 Track

DIFFERENCES BETWEEN 8 TRACK AND CURRENT EXERCISE

NOVEMBER 8, 1996 VS. DECEMBER 15, 2000

8 TRACK HAD AMSU A NOISE LOWER BY A FACTOR OF 3

- NOISE NOW CORRECTED BUT MICROWAVE PRODUCT FIRST GUESS WAS NOT CHANGED
- CURRENT ERRORS DO NOT APPEAR TO BE AFFECTED BY ACCURACY OF MICROWAVE GUESS

MICROWAVE SURFACE EMISSIVITY WAS MADE MORE REALISTIC

INFRARED SURFACE EMISSIVITY WAS MADE MORE REALISTIC

- DID NOT AFFECT ACCURACY OF TEMPERATURE RETRIEVALS

CLOUD REFLECTIVITY VARIABILITY INCREASED SIGNIFICANTLY IN NEW CASE

NEW RTA COEFFICIENTS, NEW REGRESSION COEFFICIENTS

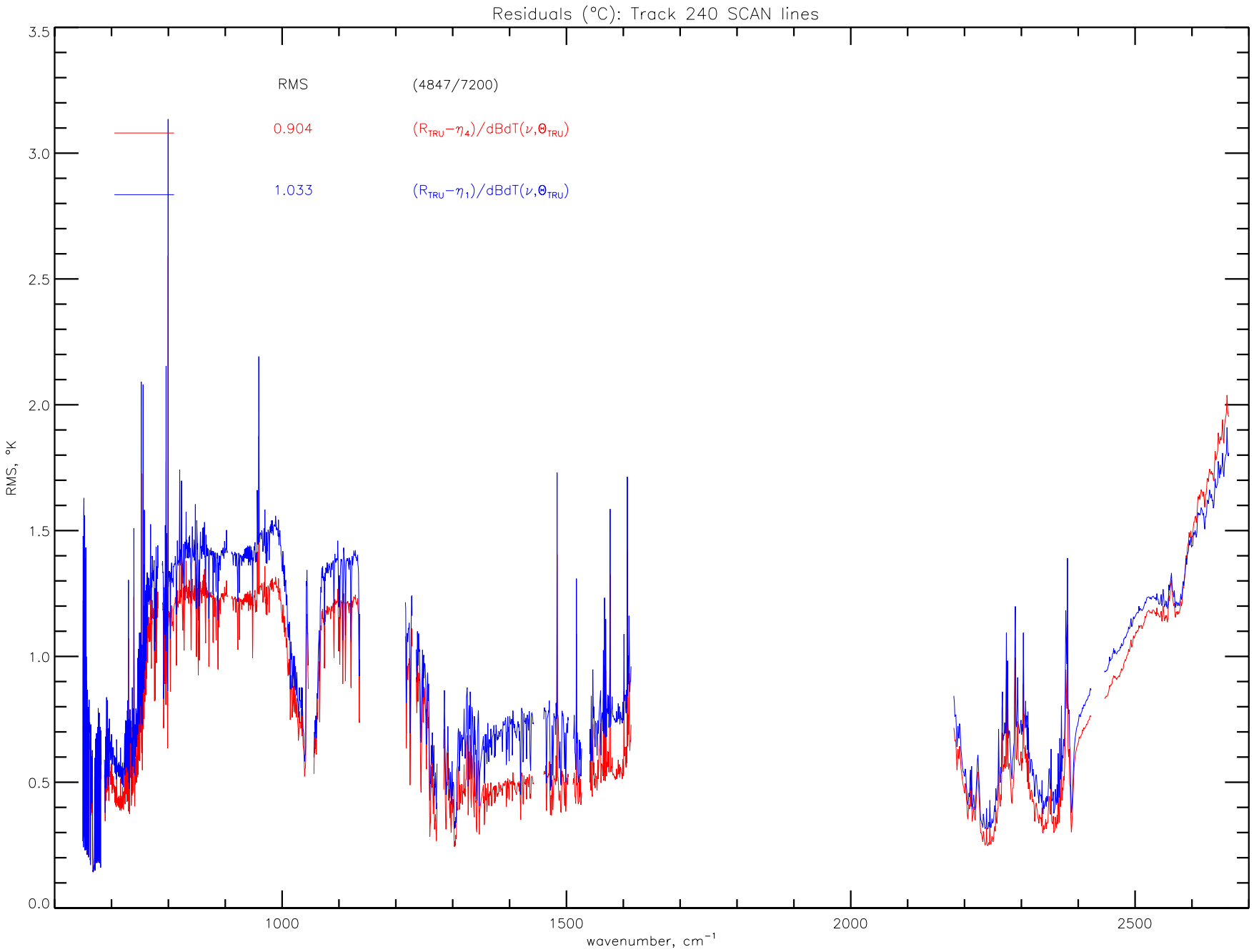
SOME VARIABILITY IN TRACE GAS CONCENTRATIONS ADDED

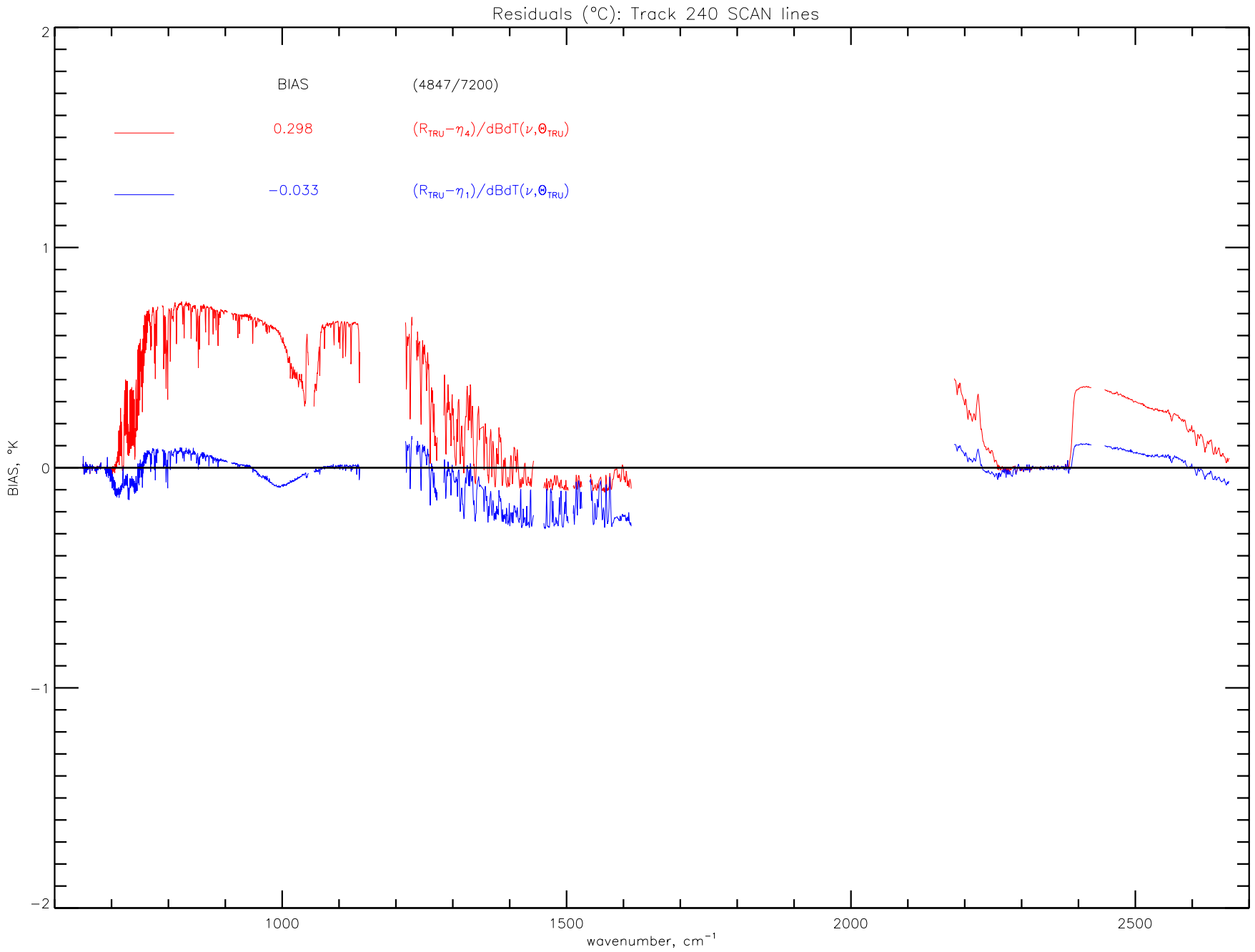
- CAUSED MINOR DEGRADATION IN RESULTS

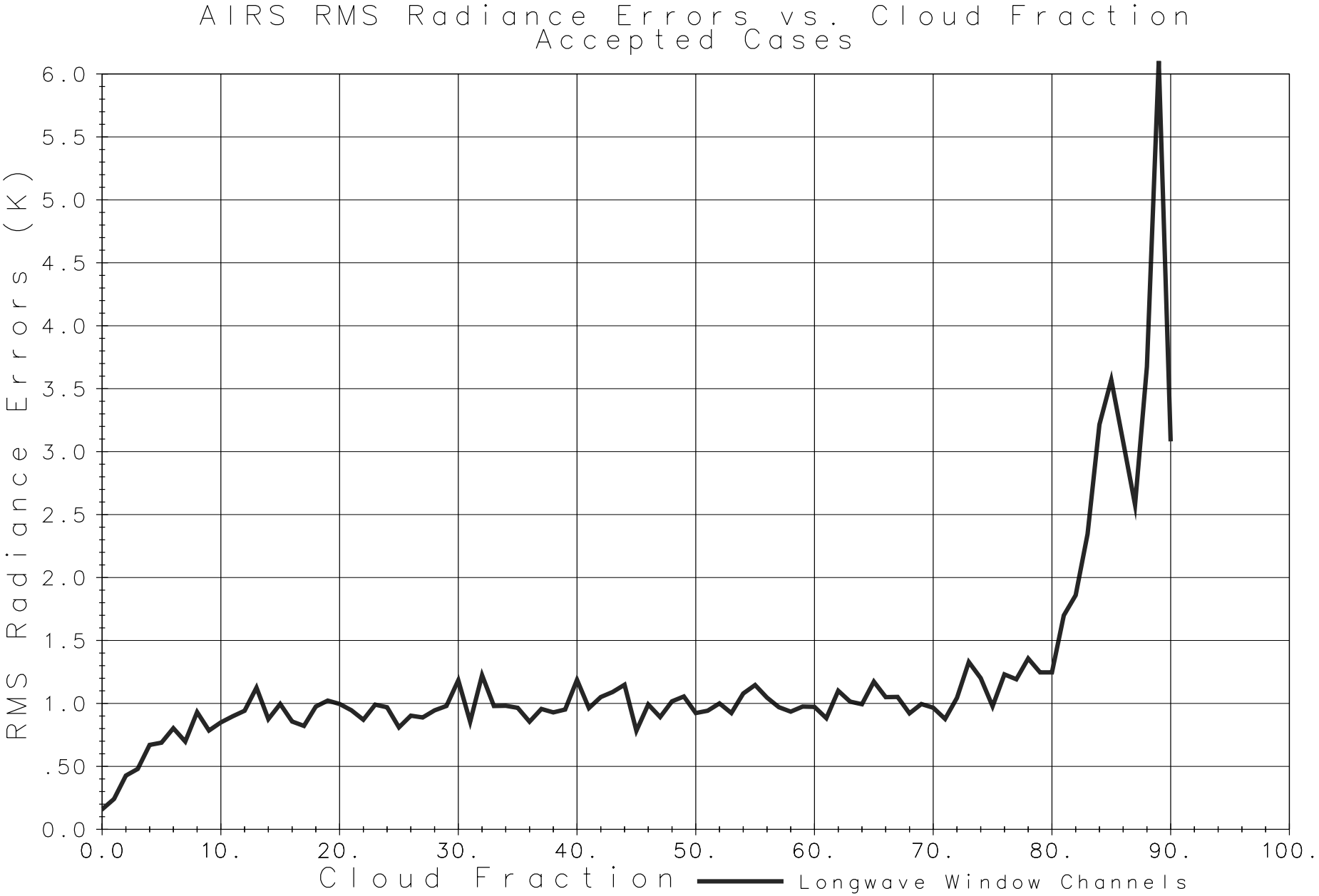
RADIANCES WITHIN AMSU A FOOTPRINT ARE ALL AT THE SAME ZENITH ANGLE IN 9 TRACK

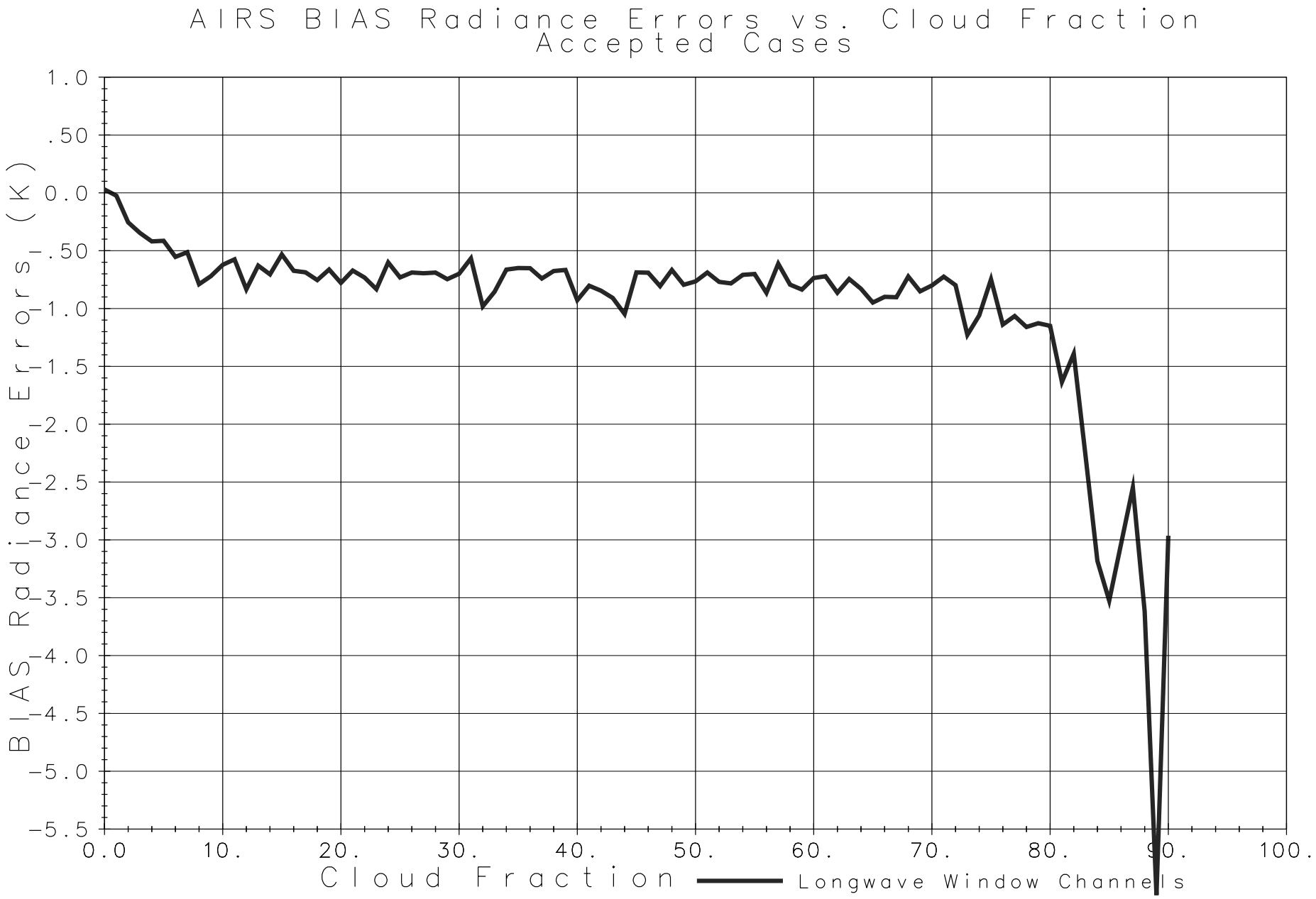
- SHOULD BE A MINOR EFFECT

NONE OF THE ABOVE CHANGES APPEAR TO EXPLAIN MAJOR DEGRADATION IN RESULTS


Residuals (°C): Track 240 SCAN lines
RMS
(4847/7200)
0.904
(R_TRU−η_4)/dBdT(ν,Θ_TRU)
1.033
(R_TRU−η_1)/dBdT(ν,Θ_TRU)
RMS, °K
wavenumber, cm^-1
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1000
1500
2000
2500


Residuals (°C): Track 240 SCAN lines
BIAS
(4847/7200)
0.298
$(R_{TRU}-\eta_4)/dBdT(\nu,\Theta_{TRU})$
−0.033
$(R_{TRU}-\eta_1)/dBdT(\nu,\Theta_{TRU})$
BIAS, °K
2
1
0
−1
−2
1000
1500
2000
2500
wavenumber, cm^{-1}


AIRS RMS Radiance Errors vs. Cloud Fraction
Accepted Cases
RMS Radiance Errors (K)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.50
0.0
0.0
10.
20.
30.
40.
50.
60.
70.
80.
90.
100.
Cloud Fraction
Longwave Window Channels


AIRS BIAS Radiance Errors vs. Cloud Fraction
Accepted Cases
BIAS Radiance Errors (K)
1.0
.50
0.0
-.50
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-5.5
0.0
10.
20.
30.
40.
50.
60.
70.
80.
90.
100.
Cloud Fraction
Longwave Window Channels